The Marshall Cavendish Encyclopedia of the Human Mind and Body.

Book of Life

IN 105 WEEKLY PARTS – PART 1

Every Monday
United Kingdom 3/6
Australia 55c
New Zealand 55c
South Africa 50c

The Living Body/**Your heart is like this** Life Together/**Understanding sexual attraction**
The Child and his World /**First days of an unborn child** Human Mind/**Answers to anxiety**
The Medicine of Man/**Victories in an endless war** Enemies of Man/**Are you digging a grave with your teeth?**

Book of Life

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Contributors to this Issue

Robert Shields, B.A., Ph.D., F.B.Ps.S.
Dennis Bardens
Diana and Meir Gillon, LL.B. (Lond.)
John Addey, LL.B.

On the cover

A man, a woman, a child create a human family. Book of Life is their story, the story of the strange and complex living creatures that we are. In love and in grief, in sickness and in health, the business of being human is a life long adventure. Here, for the first time, is its encyclopedia.
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Publisher: Norman Marshall.
Editor: Peter Way.
Art Consultant: Al Rockall.
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Editorial Authenticator: Martin Bax, B.M., B.C.H.
Assistant Editors: Susan Forsyth, Katherine Ball, Valerie Mendes, Ruth Gardiner.
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Your heart is like this

The heart's *lubb dup* beats out the rhythm of life itself. What is this machine that can run for 100 years without pause for repair? Why have lovers and Aztec priests and surgeons paid it such respect? page **1**

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Understanding sexual attraction

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First days of an unborn child

Day one, a new human life begins with an egg one quarter the size of this full stop. Twenty five days later the child-to-be already has a beating heart. The way a human being begins to happen is the strangest miracle. page **11**

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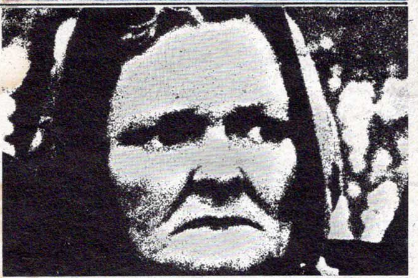

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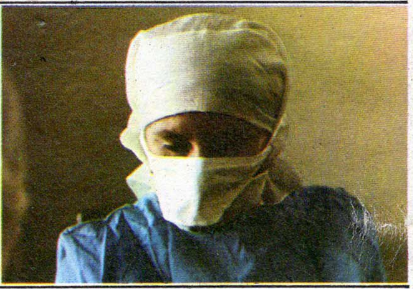
Victories in an endless war

We have weapons for which Man has been searching since the human race began: weapons to fight the ancient enemies of health. Where is medical science on its way to next? page **20**

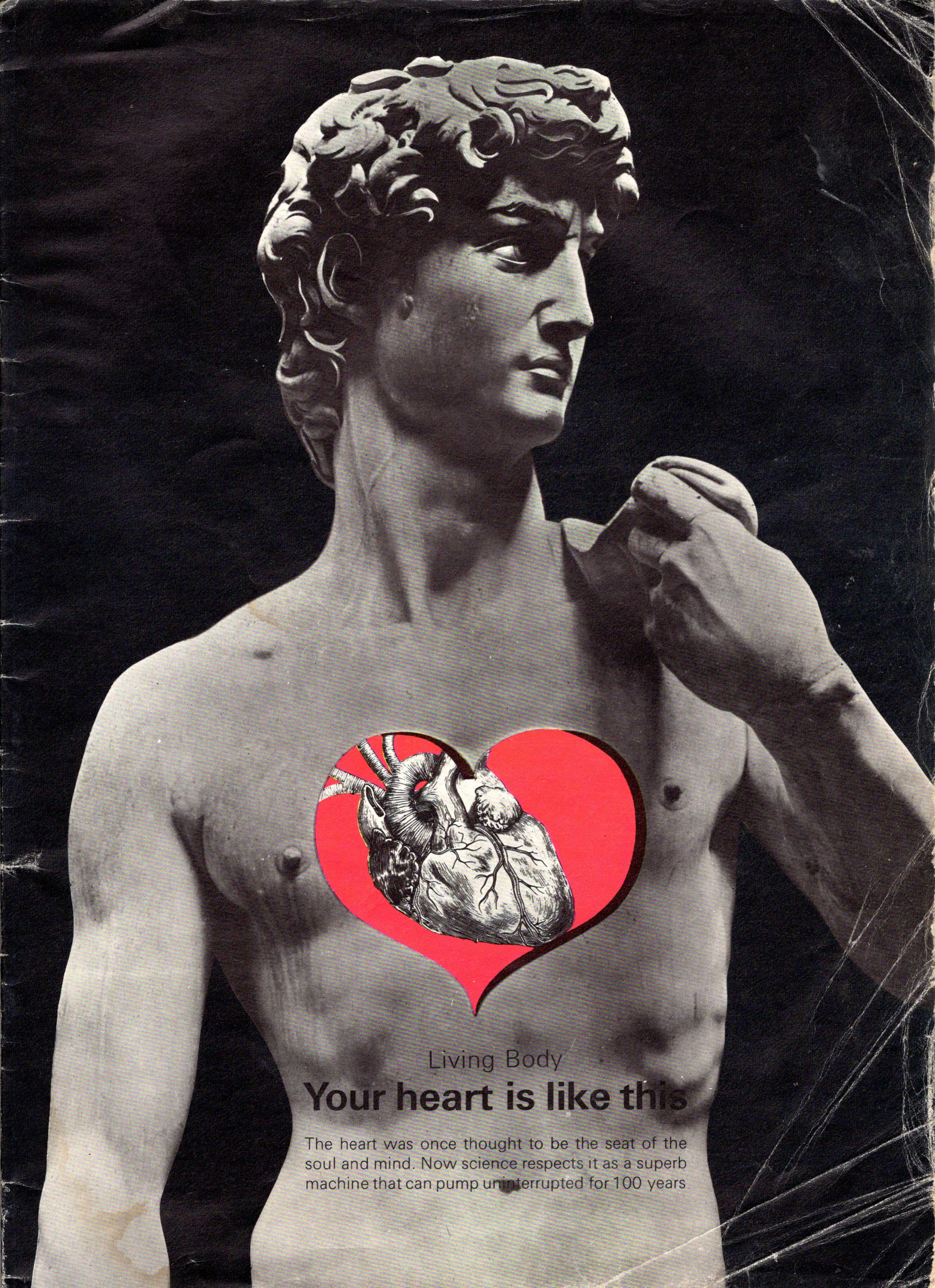


Enemies of Man
Digging a grave with your teeth

Food is the fuel of the flame of life. Here is an expert dietician's view of the insults and injuries we offer our digestion. Here are the essential facts behind the ways that our daily diet can work for or against us. page **24**

Next Week

Book of Life builds week by week into a complete seven-volume work of reference. Next week *Enemies of Man* examines the risks you may run from being overweight. *Life Together* analyses in depth the experience of falling in love. *Human Mind* enters the hidden, meaningful world of dreams. The part drugs play in life today is reviewed in *The Medicine of Man. The Child and his World* continues the enthralling story of life before birth. Plus 'Heart-break, heart-mend', in our *Living Body* series. Plus your next pages of the Marshall Cavendish Dictionary of Medicine.



Living Body

Your heart is like this

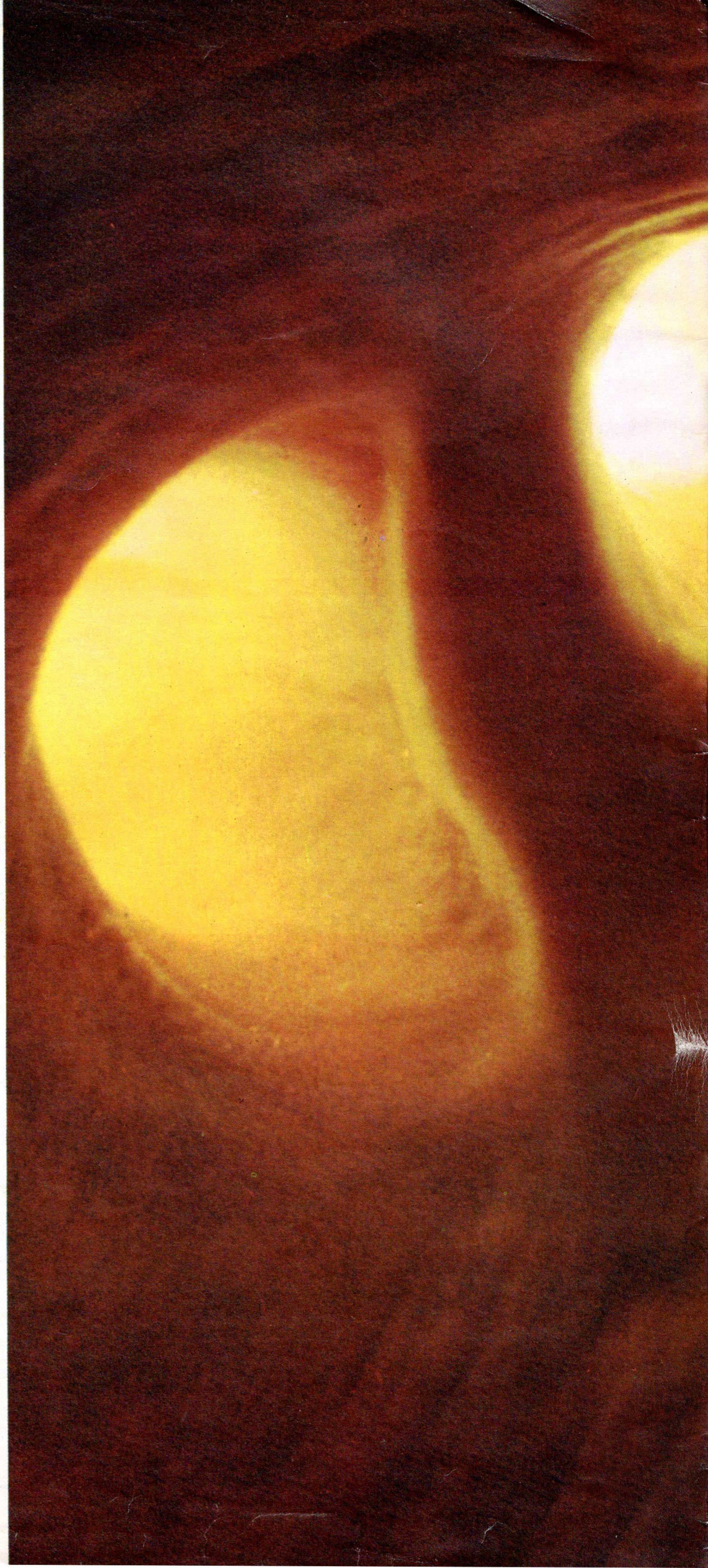
The heart was once thought to be the seat of the soul and mind. Now science respects it as a superb machine that can pump uninterrupted for 100 years

NOT much larger than a clenched fist, your heart is among the most remarkable machines in the world. Every day it does enough work to lift a man weighing 150 pounds almost 1,000 feet in the air. Every day it pumps some 2,000 gallons of blood, circulating the body's $10\frac{1}{2}$ pints again and again. Your body contains a network of arteries, veins and capillaries 60,000 miles long. The heart's task is to keep that network supplied, perhaps for 100 years without pause for servicing or repairs, with the fluid that bears nourishment for every living cell.

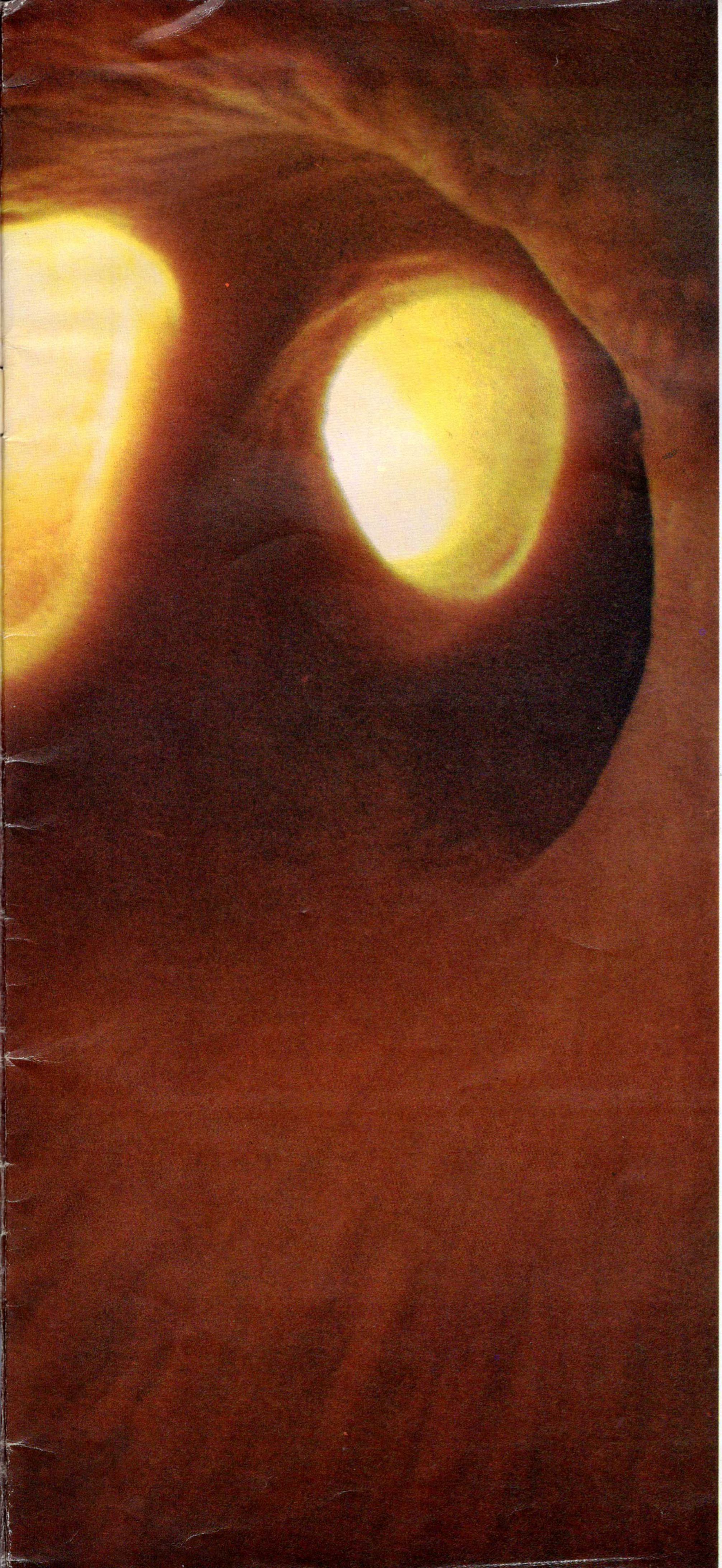
Man has always been conscious of his heart. Mostly, we are strangers to the hidden world beneath our skin. The kidney makes no sound while it does its work. Only an occasional belch betrays the stomach's energetic activity. But the heart's lubb dup reminds us it is there. Anger, fear, love and strenuous movement provoke it to quicken its beat. Did early Man, muddling cause and effect, think that his heart was the place where courage and love began? Hardhearted, heartless, fainthearted, broken-hearted: the world's languages link the little muscular pump with every emotion known to humanity.

IN an average lifetime, the heart will beat some 2,500 million times. Only four weeks after conception it takes its first flutter; in the newborn baby, as in some tiny, frantic wristwatch, the heart beats about 130 times a minute. In adults it throbs some 70 times a minute, or roughly four times for every breath. The infantile speeds are only matched in adult life during strenuous exercise, pain, fever or asphyxia, anxiety or intense pleasure. In emergency the heart's sensitive response quickly supplies more fresh oxygen to the brain and other centres, so that thought and action speed up. It can pump as many as 12 gallons of blood a minute, or eight times as much blood as in a period of relative relaxation, adapting as necessary to a short or long term increase in its work load.

Dramatic, often bloody, rituals have centred on the human heart. In ancient Mexican temples, Aztec priests held down their chosen victim, cut out his heart and offered it up to replenish the life giving powers of the sun. Others believed that eating a heart transferred its virtues to the consumer. At Ibadan, in



The strange, hidden landscape of the human body reveals its beauties to the camera of a Swedish photographer, Lennart Nilsson. The picture, right, was taken at one of the major 'road junctions' within the body's many miles of arteries and veins. At this point, just above the heart, three arteries branch. Blood, freshly enriched with oxygen, throbs through these living tunnel walls, direct from the aorta. The cavern opening on the left is now the blood's route to supply the right cerebral hemisphere of the brain and the right arm. The middle opening takes blood to the left half of the brain, the artery on the right leads to the left arm.

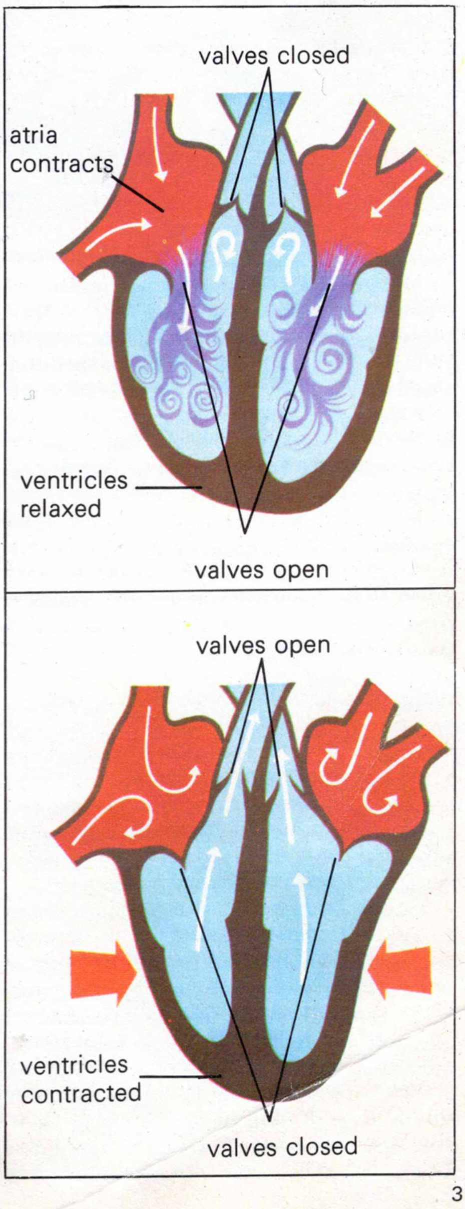


Lennart Nilsson

Nigeria, the king's heart was eaten by his successor; after killing a particularly brave enemy, mountain Basutos carved out and ate his heart. Bushmen in South Africa believed that their children would be made brave by eating the heart of a leopard. The Ainu of Japan were certain that the water ousel was a bird of great wisdom and eloquence who could pass on these powers in its freshly eaten heart. The burial of the heart apart from the body became a common ancient and medieval practice: it was done for Richard I, whose heart lies in a casket in Rouen Cathedral, for Henry III, Edward I, and James II.

Roughly resembling the popular Valentine image in shape, the heart lies in a double sac of slippery membrane called the *pericardium*, which allows it freedom of movement and helps to keep it in position. Normally weighing 11 oz. in the

Listen to the sound 'lubb dup' as the valves within your heart close. These diagrams show the two separate pump-like movements: first, with a small contraction the walls of the right atrium push oxygen starved blood into the relaxed ventricles. These then contract strongly, and blood pressure opens the semi-lunar valves to allow blood into the arteries.



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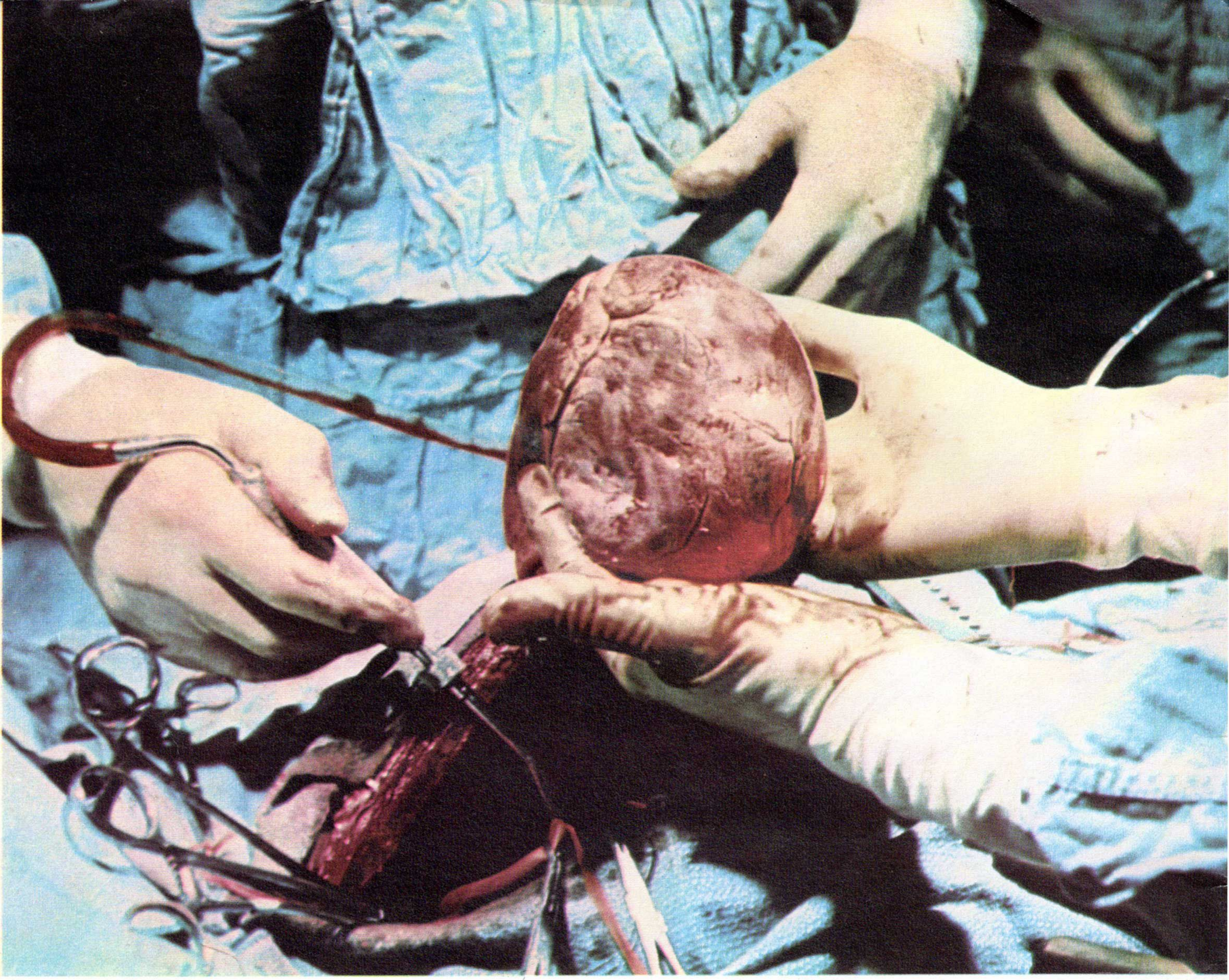


Transworld Feature Syndicate

For surgeons, the heart is a special challenge. Until very recently, the failure of this vital pump meant the end of life. Then, in the late 1960s, the possibility of giving a critically ill patient a second heart became a matter of world wide controversy. The operation, in itself straightforward, was often followed by fatal rejection of the new organ by the body's own protective devices. And many questioned the right of doctors to perform such operations at all. For the American patient above, the new heart (held here ready for insertion) brought extra days of life, work and happiness in the human community.

average male, and 9 oz. in the female, the heart is about 5″ long, $3\frac{1}{2}$″ wide, and $2\frac{1}{2}$″ deep at its lowest point. It is about 0.43% of the body weight in the male and in the female about 0.4%; in children, however, it is a greater percentage, and in active animals, like the deer or greyhound, it is about 1% of the body weight.

The heart's walls are made of thick muscle, and within this tough framework are four hollow chambers: a right and a left receiving chamber, or *atrium*, and below these the main pumping chambers, the right and left ventricles. A solid partition of muscle, called the *septum*, separates the left and the right sides of the heart. A simple way of describing the heart, then, is to say that it functions as two separate pumps, side by side. This is essential if the body is to cope with the complex development of lungs and breathing air. Venous blood returning to the heart first has to be pumped through the lungs before it can be re-used; the blood thus oxygenated then comes back to the heart and is pumped round the body.

The heart cannot afford to rest for more than about half a second between beats: the body's vital centres, such as the brain, would suffer severe damage if their blood supply, containing essential sugar and oxygen, were to cease for more than two or three minutes. It took man thousands of years to learn the workings of this vital organ. The realization and proof that the same small amount of blood circulated through the heart again and again was, in fact, the key to our basic understanding of the entire circulatory system. Here, in a step by step account, is the way the heart goes about its task.

1. After circulating round the body, blood which has given up its oxygen and needs to be refreshed returns to the right atrium through the two large veins, the venae cavae. 2. Aided by a small contraction it then passes through a one-way valve into the right ventricle. 3. From here it is pumped by the ventricular contraction into the pulmonary artery through the pulmonary valve, and circulates through the vessels in the lungs. 4. Here the oxygen from the air we inhale diffuses across the lung membrane and vessel wall into the blood. Simultaneously, the waste product carbon dioxide diffuses in the opposite direction to be exhaled. The oxygenated blood then returns in the pulmonary vein to the left atrium, where it passes to the left ventricle through the mitral valve. 5. Then, with a strong contraction the left ventricle ejects the blood through the aortic valve into the aorta. From here it will circulate in the arteries up to the head and down to the rest of the body. Then the whole process is repeated.

Although the ventricles send blood to different parts of the body, they contract at the same moment, as do the atria. The phase of ventricular *contraction* is known as the *systole* of the heart, and the ventricular *relaxation* is called *diastole.* During a contraction, two valves (the mitral and the tricuspid) close to shut off the atria so that blood cannot pass back into them; after a contraction, two more valves (the pulmonary and the aortic) close to prevent the backflow of blood into the ventricles. The familiar 'lubb dup' sound of the heart is the sound of these two sets of valves closing. The left ventricle has to perform seven times as much work as the right, against the resistance of the whole circulatory tree of the body, and its wall, about half an inch thick, is three or four times thicker than that of the right ventricle. At each contraction, about two ounces of blood are ejected from each ventricle.

One of the heart's most amazing faculties is its sensitivity to the whole range of passions, sudden sounds, extremes of temperature that demand a quickened pace of beat. The mechanism is a supply of electrical and chemical impulses from the body's nervous systems. These sweep through conductive tissue embedded in the heart muscle. As they radiate over the walls of the atria, they cause them to contract. Surgeons can install artificial pacemakers if the natural system should fail for any reason.

Since the earliest human being placed his hand upon his heart and wondered what its beat might mean, men have devised explanations for its activity, some fanciful, some amazingly perceptive. About 3,000 years ago the author of a Chinese medical treatise arrived at the following correct description: 'It regulates all the blood of the body . . . The blood current flows continuously in a circle and never stops.' The discovery never got very far: centuries later people who had gathered increasingly accurate data about the structure of the heart and the blood vessels, still continued to guess wrongly about the way the system performed.

THE Egyptians thought of the heart as the home of the soul, the centre of intelligence and all human emotions. They recognized the important fact that 'channels and strands' led from the heart to all parts of the body, but believed that the channels carried substances which included air, mucus, nourishment, semen and excretions, as well as blood. During the process of embalming, the heart was always left carefully in the thorax, still attached to the great blood vessels, with all the surrounding organs removed.

The Greeks, from the 4th century B.C., struggled with ideas and theories about the heart, often coming close to the truth. In Alexandria, the great Greek anatomist Erasistratus came close to answering the mystery of blood circulation by describing the heart as a pump; unfortunately, he thought of the system as working backwards: from the liver by the arteries to the heart, and thence to the lungs by the veins.

The philosopher and scholar Aristotle, 384–322 B.C., taught that the heart was the dwelling place of life, the mind and the soul, the hearth from which emanated generative animal heat, and that the blood and blood vessels were derived from it.

Considered to be the Greek founder of experimental physiology, Galen, 131–201 A.D., was an indefatigable dissector, chiefly of pigs and monkeys. Not realizing that the heart was made of muscle, he described it as having three layers of fibres; he also discovered that arteries contained not air, but blood. He originated a theory about the heart, however, which was to cause confusion among medical men for centuries: he maintained that there were invisible openings in the septum through which blood was supposed to exude from the right into the left ventricle. It was not until the 1600s that European medicine grasped the idea of the two separate circulations. Also mistaken, was Galen's doctrine of 'vitalism'. In the left ventricle of the heart, he said, the blood was given 'vital spirits' which were converted into animal spirits in the brain, and the whole organism was animated by 'pneuma'. His belief that the arterial and venous blood flowed slowly out of the heart in separate systems of vessels was for nearly fourteen centuries accepted without question.

New light on the still unexplained problem was shed in the Renaissance. Leonardo da Vinci, 1452–1519, by drawing from dissections, noted the one-way valve system of the heart.

Probably the greatest name in 17th century science was William Harvey, 1578–1657. Born in Kent and educated in Cambridge and Italy, it was not until 1616 that Harvey first expounded his views on the movements of the heart and blood. He attached great importance to experimental vivisection, examining the hearts of 15 different species of animals, ranging from the pig to the lobster; from these he learnt about the arrangement of blood vessels and the way the heart contracts and expands. He also used living human beings, tying their blood vessels, and thus demonstrating the one way valve system operating in the veins: when tightly bandaged these would swell while the arteries would not, and vice versa. Harvey concluded that the veins and arteries must function separately as incoming and outgoing channels for the blood.

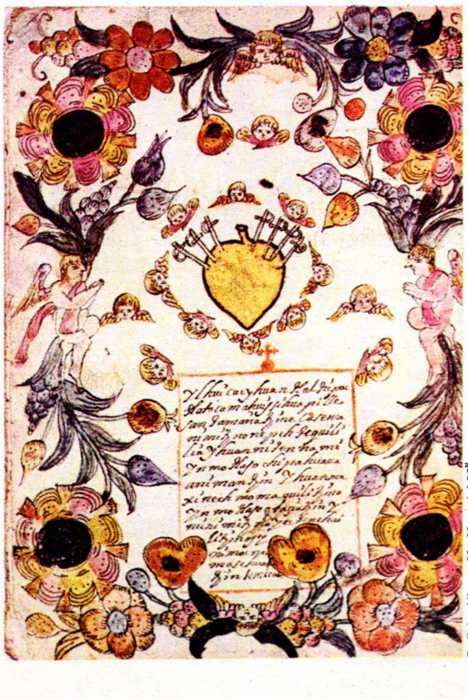
His most outstanding achievement, however, was to prove, after centuries of misbelief, that 'The movement of the blood is constantly in a circle and is brought about by the beat of the heart'. Published in 1628, Harvey's work *On the movement of the heart and the blood* startled the medical world which at first fiercely opposed its theories. His treatise proved that the contraction of the heart coincides with the pulse, and that the ventricles pump their blood into the aorta and pulmonary artery. The pulse is produced by the arteries being pumped with blood. Eventually, Harvey's theory that the body was pumping the same blood round and round the body was found to be irrefutable. Although the word 'circulatio' had been used in the past, nobody before had ever conceived of a continuous blood stream returning to its source time and again.

But although Harvey showed that there were no pores in the septum of the heart, he failed to pinpoint the place where the blood stopped moving away from the heart and began to move towards it. The answer was found in 1661 by the Italian physiologist Marcello Malpighi, 1628–1694, who was one of the first to use the microscope to examine animal and vegetable structures more closely. Peering at a frog beneath a microscope Malpighi saw for the first time the blood flowing through a network of small tubes on the surface of the lung; these were the capillaries, the connecting links between veins and arteries. Smallest of all blood vessels, the capillaries are so slender that ten of them together are no thicker than a hair. Although Harvey had correctly inferred the existence of the capillaries he had never actually managed to see them.

So, by the middle of the 17th century, with the work of Harvey and Malpighi, the chaos of fact and fiction eventually began to be sorted out, and the knowledge we have today of the heart as the great all-rounder started to emerge more clearly.

The future of medicine may make possible an era in which hearts, like car engines, can be replaced without drama or anxiety. Will that era dethrone the heart as the deepest symbol of love and loyalty in the human vocabulary,

For many Christians, the heart is a symbol of religious devotion: the Virgin's heart, pierced by seven sorrows and guarded with flowers, illustrates an 18th century Mexican manuscript.



Bodleian Library, Ms. Mex. e.l.f 22v

For all lovers, the heart is a symbol of their passion: an anonymous Victorian promised life-long adoration with his gift of this traditional, fanciful valentine to his beloved.

Courtesy of the Victoria and Albert Museum Photo R. B. Fleming

Understanding sexual attraction

The human race would have become extinct long ago without the ability of men and women to attract each other sexually. What is this useful attribute?

FROM more than a mile away some male moths can sense the presence of a female of their species and fly unerringly towards her. There is no doubt that the female moth has sex appeal. For human beings, the subject is more complicated. Human beings, alone among living creatures, worry about whether they are sexually attractive or not. Some try to exert more sex appeal than they feel they have naturally (and to do so may borrow the furry skins of wild beasts, the scented substances from flowers and animal glands). And some try to exert less sex appeal, wrapped in the sombre colours of religious communities.

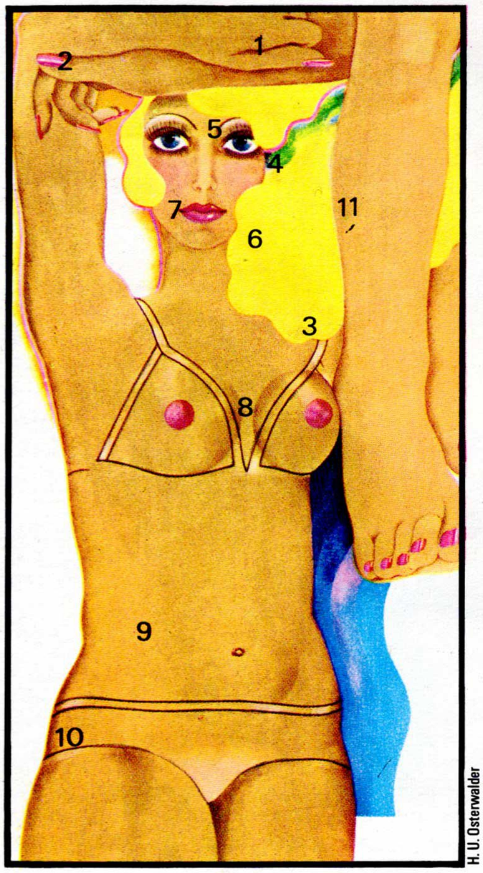
Sex appeal, among humans, is *not* a 'thing' that one possesses in the way one either has or does not have a pair of shoes.

The girl with shining hair, warm smile and curving figure obviously 'has' sex appeal in that men's heads turn, with something like the enthusiasm of the male moth, when she passes. Breasts, legs, eyes and hair are triggers to sexual response. And most people have spent time before a mirror wondering about themselves and their ability to attract a partner. But really to find out about our own powers to attract or be attractive sexually is more than a matter of adding up vital statistics and buying aids to beauty. We have to know something about the deepest instincts and emotions of humanity in general, ourselves in particular.

First, it is fortunate for the survival of the human species that men and women are attracted by, and attractive to, each other. For sexual attraction is the first step towards love, marriage, home-making and child-bearing. It is a natural and basic instinct shared in its essentials with the animal world, but immensely complex in its expression in human society.

This basic interest in the opposite sex has its roots in infancy. It can be seen developing in young children of pre-school age. A little girl, for example, usually shows by the time she is three a marked response to her father. She will behave coquettishly in his presence and may act in a similar fashion with any male friends of the family who call at the house. Men obviously intrigue her in a way which women do not. At one time or another most little girls have said, 'When I grow up I'm going to marry my Daddy.'

A little boy for his part usually remains emotionally tied to his mother throughout infancy. Though fond and admiring of his father, it is mother who holds a special place in his affection. He may be very possessive of her and show this by jealousy of the father's privileged position in relationship to her.



H.U. Osterwalder

An eminent zoologist has described Man as 'the sexiest primate alive'. Various parts of the female body act as triggers to sexual response – cultural and personal factors dictate which are the most alluring to any particular male.
1. Soft, white, delicate hands suggest the woman's sexual tenderness.
2. Nails were originally designed as claws for digging and scraping: now they are merely added decoration.
3. In animals, hair is a warm body covering: in women, a luxuriant mane functions primarily as an erotic magnet.
4. During intercourse, the eyes glisten, the pupils dilate: cosmetics emphasize the eyes' sexual overtones.
5. The custom of rubbing noses in some societies suggests they may be erotically sensitive as well as functional.
6. It has been suggested that reddened protruding lips mimic the labia and act as an important sexual signal.
7. Expression is important in human courtship, so naturally the face is a vital focus of attention.
8. Breasts may appeal because their shape mimics the buttocks, which are obviously zones of erotic interest.
9. The narrow waist points the contrast to the curves above and below.
10. A wide pelvis is one of *the* distinctive female sexual characteristics.
11. Legs lead to potential delights.

Sigmund Freud, the founder of psychoanalysis, studying young children, coined the term 'Oedipus complex', to explain his view that, in normal development, the young child passes through a period of being strongly attracted to the parent of the opposite sex.

Pre-school children, then, accept the idea of an intimate bond between a man and a woman, and their games will usually include playing at 'weddings' and 'mothers and fathers'. They show great interest in the physical differences between the sexes and they want to know about sexual development and the mechanics of conception. This inquisitiveness is natural, but underlying it is a preoccupation with the attraction which one sex exercises over the other.

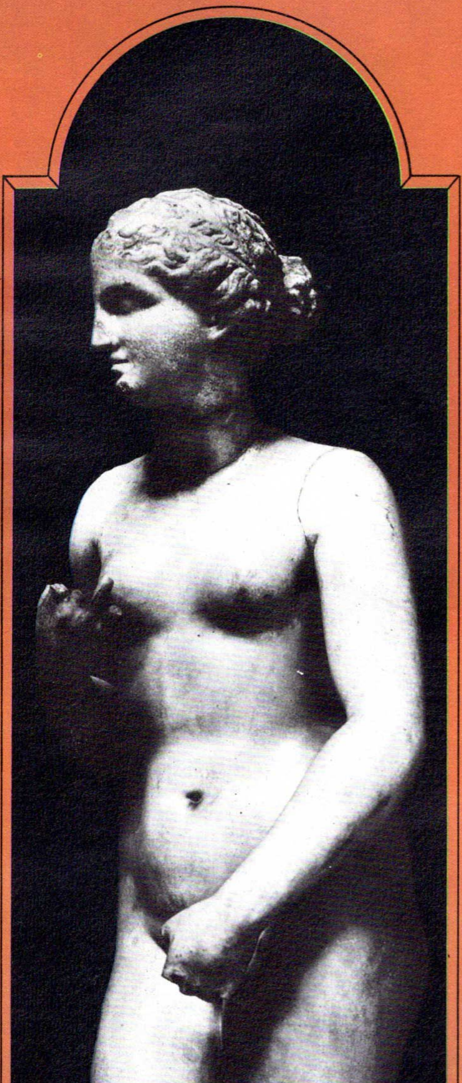
In adolescence the longing to be loved and to find someone to love is extended by maturing sexuality with its profound physical and emotional changes, and a new awareness of the part played by each sex in intimate relationships.

But the love-experiences of childhood are not completely left behind. Psychologists find that most adolescents have, over the years of childhood, built up some kind of 'image' of the person they would like to love and be loved by. This image is probably a compound picture of the men or women who have been important to the child earlier on. A boy for example, may have a clear idea of the kind of girl who would appeal to him – blonde, slim, with trim ankles. It is probable that this mental image includes elements of the idealized mother or sister or, perhaps, a teacher.

In a parallel fashion a girl may have a mental image of the kind of man she would like to be loved by – though research shows that girls tend to emphasize qualities in the character of a desired male, rather than merely his appearance. He may, for example, be thought of as gentle, good with children, honest and courageous.

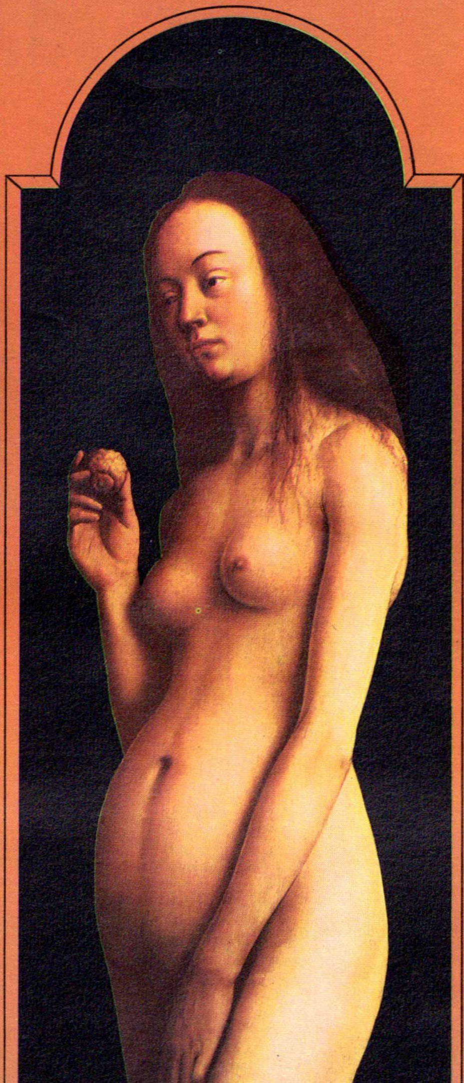
As well as having an image of the type of girl who attracts him, the adolescent boy is very conscious at this time that he must put to the test his *own* powers of attraction. For the adolescent stands on the threshold of manhood and is aware that this implies new experiences, new powers, new responsibilities. If he can attract a girl he is reassured because his adult male status is recognized and sponsored by a member of the opposite sex.

To make quite sure that girls notice him and feel admiration for his emergent masculinity, the boy's behaviour is likely to be exhibitionistic and ostentatious. And the girl will experiment with clothes, make-up, hair styles and flirtatious



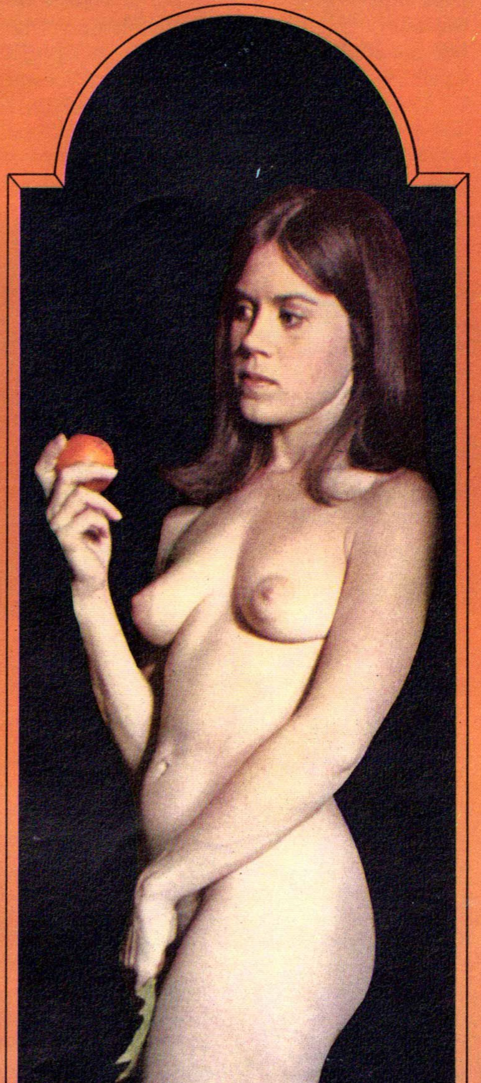
The strong, heavy-hipped body of this classical Venus suggests that her appeal is that of the mother-figure. But her proudly-carried head emphasises that there is no shame attached to her sexuality.

Mansell



To the medieval churchman, woman was the snare of the devil. So this Van Eyck Eve woefully exaggerates her only redeeming feature – her fecund belly. Procreation not sexual pleasure dictates her shape.

Church of St Bave, Ghent Photo/Scala



Liberated by Freud and the Pill, modern Western woman is more than a breeding-machine. But she may still try to increase her sex-appeal by slimming to conform to the fashion for a firm, slender figure.

Frank Habicht

1. In the Middle Ages, the church considered breeding women's only respectable function. So their garments drew attention mainly to the swelling stomach, as this painting by Van Eyck of the marriage of Arnolfini makes clear.
2. Exaggerated and restricting female clothes can indicate that the sexual climate is inhibited. This panniered court lady painted by Velasquez appears armoured against assault.

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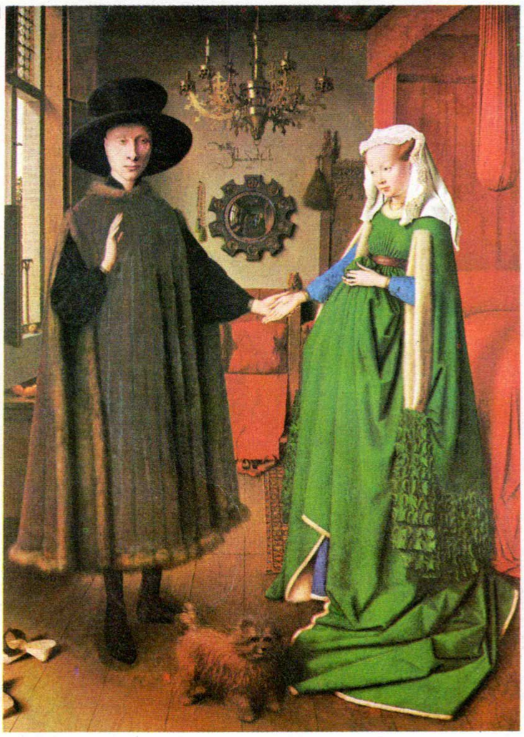
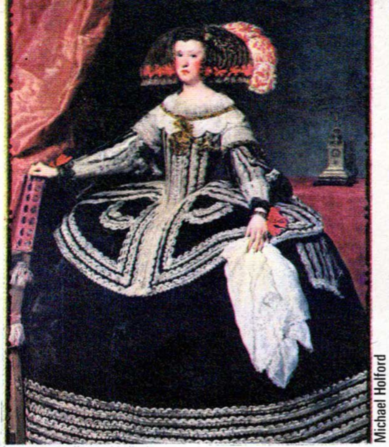

National Gallery London Photo/Michael Holford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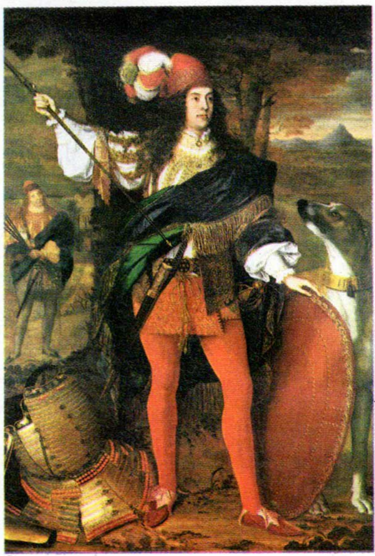
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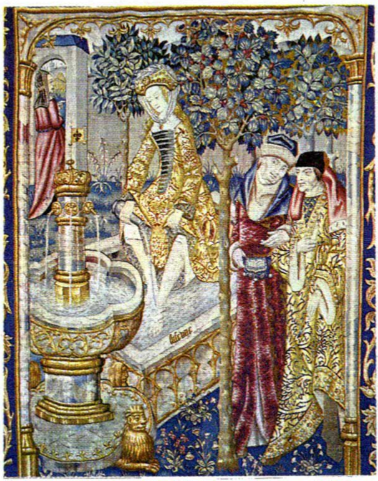
Tate Gallery London Photo/Michael Holford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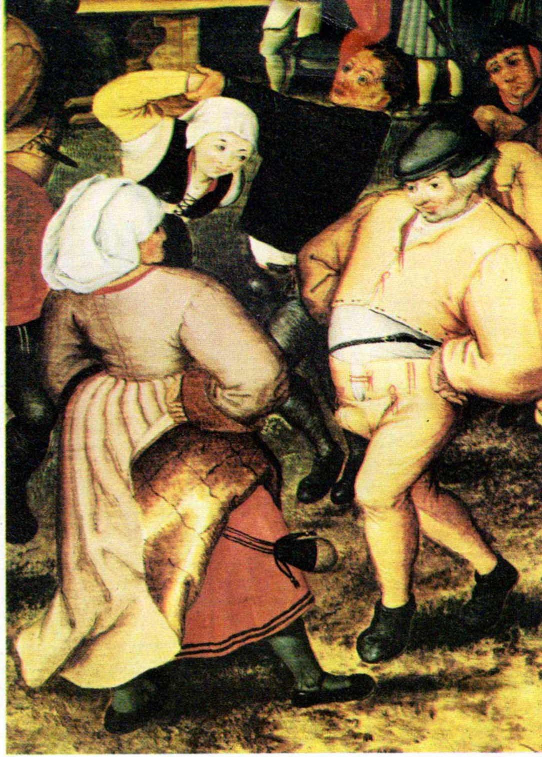
Michael Holford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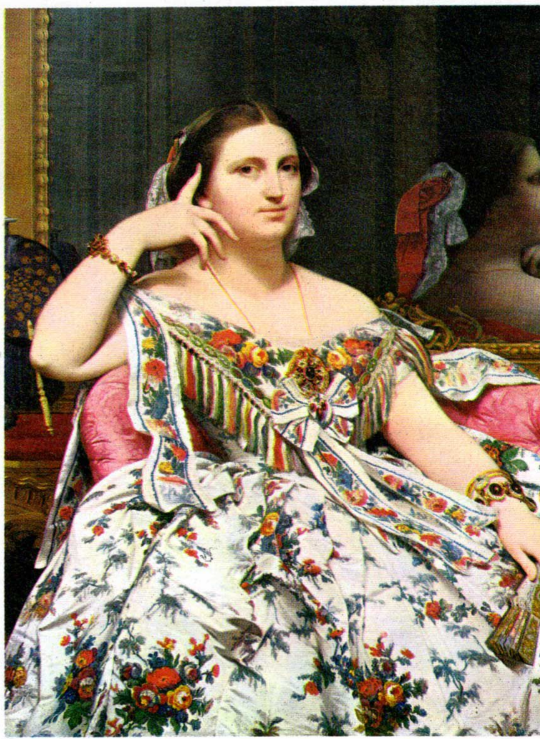
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3. Men as well as women have often been aware of the value of highlighting their physical charms by costume: in this painting by J. M. Wright, even a tassel is significantly placed.
4. Luxurious, flowing robes add dignity to the body: note that it is the men in this medieval tapestry whose garments are trimmed with fur.
5. This Breughel peasant may not be richly attired, but his cod-piece and tight breeches allow no room for doubts about his masculinity.
6. Women have always known how to emphasize their allure: see how subtly the narrow necklace of this Ingres beauty disappears into her ample bosom. The elaborate formality of her dress vividly sets off her glowing flesh.

mannerisms, testing out different ways to attract male attention.

This concern over the ability to attract a member of the opposite sex continues to a certain extent throughout the individual's life. And it leads to much speculation about what exactly constitutes sex appeal. It obviously does not rest on physical beauty alone for many men and women who cannot be called beautiful or handsome succeed in attracting members of the opposite sex.

So many other elements and qualities contribute to a woman's appeal – tenderness, kindness, gaiety, charm – that fashionable features and a perfect figure cannot even be considered the main ingredients. It was Cleopatra's vitality as much as her beauty that captivated Antony.

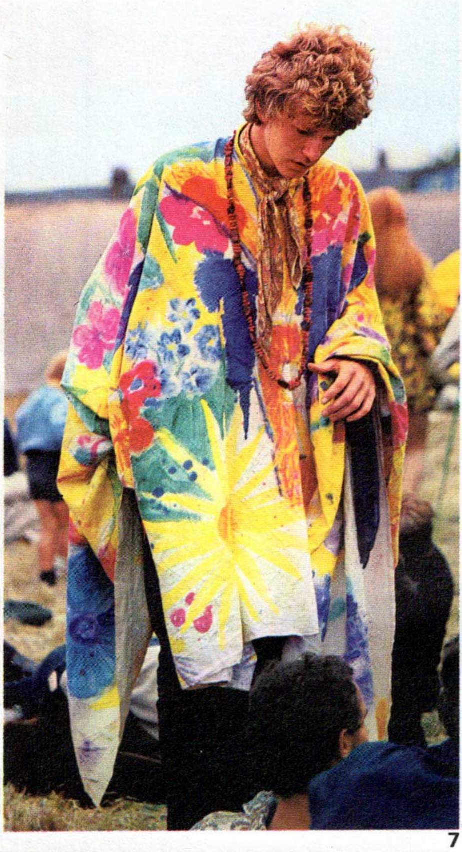
Similarly, many men who appear at first sight to lack physical appeal succeed in establishing warm relationships with women. The reason is that women admire qualities, like courage, forcefulness, ambition, protectiveness, aggression and self-confidence in a man just as much as physical prowess or bearing. Rasputin was unkempt and (reputedly) smelly; Napoleon was small in stature; Byron had a club foot – but all of them exerted a fascination over women.

It is also the case, occasionally, that a woman is attracted to a man *because* he is *not* masculine, but gives the appearance of needing a woman to look after him. In this he unconsciously appeals primarily to her maternal feeling and only secondarily to her sexual needs as a woman.

Sex appeal is normally a natural endowment in the sense that the child who has been brought up in a reasonably normal and loving home will be attracted by and will wish to be attractive to, women. He will, therefore, behave in a relaxed and friendly way with the other sex. He will seek feminine company and respond in a warm and affectionate manner to any sign of interest in a woman who appeals to him. But there are, however, some people who, for one reason or another, are unable to respond in this fashion: they will appear excruciatingly shy, diffident, defensive and 'distant' and as a result, even though physically attractive, their behaviour hinders the development of relationships, friendly or erotic, with the opposite sex.

But physical beauty is obviously an asset to anybody, and as a convenient starting-off point most young adults seek to make themselves as personally attractive as possible.

Throughout history men and women have used cosmetics and other aids to



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Museum of Fine Art Ghent Photo/Scala

Syndication International

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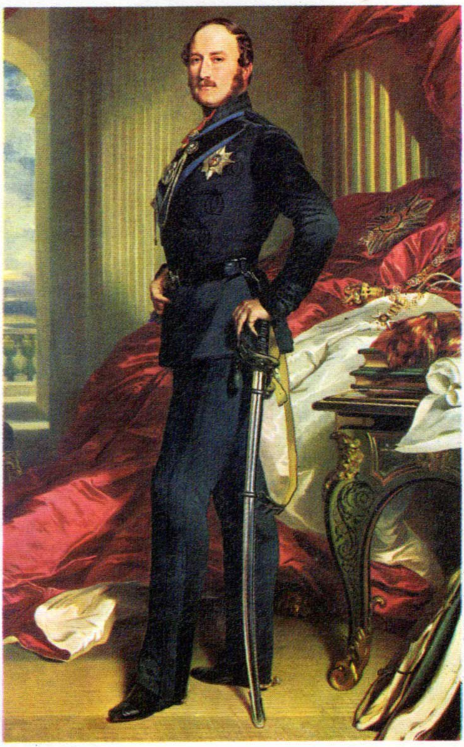
National Gallery London

7. Clothes are often used by the young as a symbol of revolt against current sexual and social mores. This young man is as gay as a courting peacock in his Hippy gear – and will appeal directly to a girl on the same wavelength.

8. In contrast, this 'Gibson Girl' has squeezed and exaggerated her figure to conform to the prevailing fashion.

11

Victoria and Albert Museum, Crown Copyright



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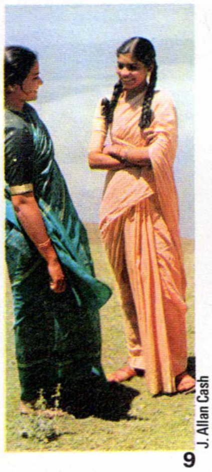
National Portrait Gallery, London

11. The Elizabethan dandy, debonair and gay, padded his shoulders and encased his legs in tight hose to draw overt attention to his physical allure. The languid pose of this young man painted by Hilliard does not mean he has any qualms about the value of virility.

12. Prince Albert, however, rigidly posed and sombrely costumed, belongs to a puritanical age. Only 'rakes' and 'loose women' took pleasure in love-making, so clothing was formal for men, concealing for women. Prince Albert was the epitome of respectability, so decorum breathes from his every pore.



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J. Allan Cash

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Japan National Tourist Organisation

Radio Times Hulton Picture Library

9. The sari may conceal almost the entire body, but it gives considerable grace of movement to the wearer: and it flatters every type of feminine figure.

10. The enveloping kimono suggests modesty, a delicate frailty: garments like this make their seductive appeal by hinting at the body's hidden charms.

increase their impact on the opposite sex. The ancient Assyrians wore their hair in a profusion of curls: Ovid reminds his male reader that to attract the ladies he must pay attention to bodily cleanliness and avoid scruffy hair and garments: in the eighteenth century both men and women in England decked themselves in high, powdered wigs and squeezed themselves into corsets. All this effort was directed towards improving what nature had provided in the way of sex-appeal.

But, of course, ideas and standards of beauty and desirability are subject to fashion. Fashions in anatomical architecture, for instance, vary enormously. At the present time, the kind of feminine ideal in the West is the slim, narrow-hipped girl. Towards the close of the last century, the preferred sexually attractive figure was the bosomy girl with a wasp waist and wide pelvis who wore a bustle to add further emphasis to the hour-glass shape. Compare this with the medieval ideal of the slender, tiny-breasted Venus with a softly rounded stomach. And again – if the paintings of Rubens can be taken as a representation of a contemporary ideal – girls who today would be regarded as somewhat plump were thought to be enticing and seductive.

Clothes, too, have followed shapes and the cultural climate of the times. And in many periods, men have not hesitated to dress as showily as their womenfolk. In the Middle Ages, young men of the upper classes, reflecting the age of the troubadours and the concept of gay chivalry, wore extravagant costume and bright colours. The Elizabethan dandy, adventurous and confident, was as gaily decorated, jewelled and scented as his lady. With the advent of puritanism, however, came a complete change in fashion. Clothes became sober in style and sombre in colour – while the woman who used cosmetics was considered 'loose'.

To the religious extremist, sex and sin were scarcely differentiated. Sexual intercourse was permissible only within marriage and with conception intended. It was considered sinful for a woman to dress in gay colours in order to attract a man's attentions: rather, she must conceal her body in enveloping garments to avoid stirring male desire at all. The strictest of all the Puritan sects even required their womenfolk to hide their hair under close-fitting hats.

In the Victorian age, a certain amount of decoration in women's clothes was acceptable (though the dress of the men was very restrained), but a form of puritanism pervaded upper and middle class society. It was expected that the sole aim of a 'virtuous' woman was to marry an 'upright' man and bear his children: no 'respectable' woman was supposed to take pleasure in sexual intercourse: if she did enjoy love-making it was a source of secret shame. Thus the attitude to sex-appeal, as such, was coloured by a fair amount of hypocrisy. However, beginning with the work of Freud, there has been a far-reaching reaction. Freud was able to show that, no matter how earnestly he may deny it, every individual possesses a sexual drive, and that emotional health depends to a large extent upon the degree to which sexuality and love are interwoven in experience.

Not unnaturally, the concept of sexual attraction varies not only between different historical periods but between one culture and another. Few Western men would be attracted by the deeply-scarred face of the women in certain African tribes, nor would they consider as sexually stimulating the minute feet crippled by binding of the Chinese women of fifty years ago. Equally well, no Western woman would find the face of a Papuan native, with a bone thrust through his nose, a sexually exciting image. What one culture finds sexually desirable is closely related to the local ideas of manhood or womanhood.

Ideas of what is alluring in costume vary widely, too: the concealment of the Japanese kimono and the Indian sari contrast markedly with the figure-revealing mini-skirt and tight jumper of the Western girl, but within the respective cultures the different outfits perform the same functions of emphasizing prevailing concepts of femininity. Which *part* of the female body must be concealed by costume is also a matter of local, usually religious custom.

Sex appeal cannot be viewed as a static thing. It is always *there* in the sense that men will always be aware of women as desirable, exciting and potentially lovable creatures. And women cannot ignore the existence of men as strong, protective and stimulating companions. Great variations, however, take place in the ways in which both men and women choose to emphasize their essential masculinity or femininity, in the hope that sexual attractiveness will lead on to mature love and mutual belonging.

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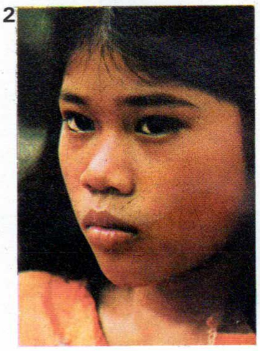
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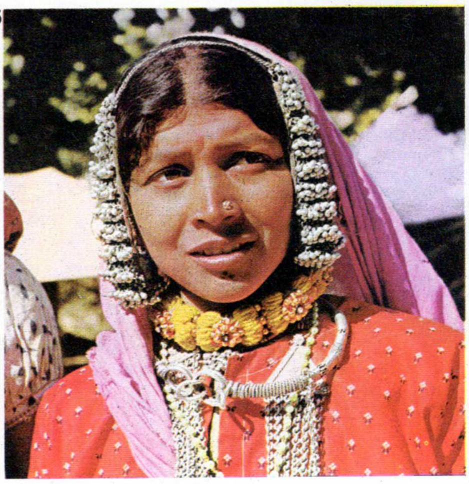
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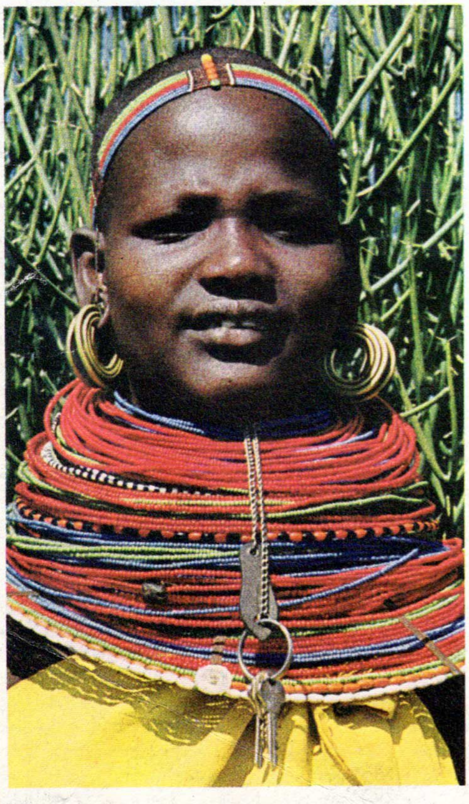
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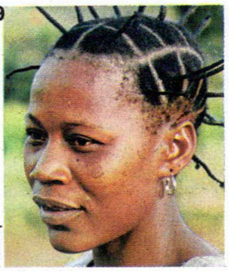
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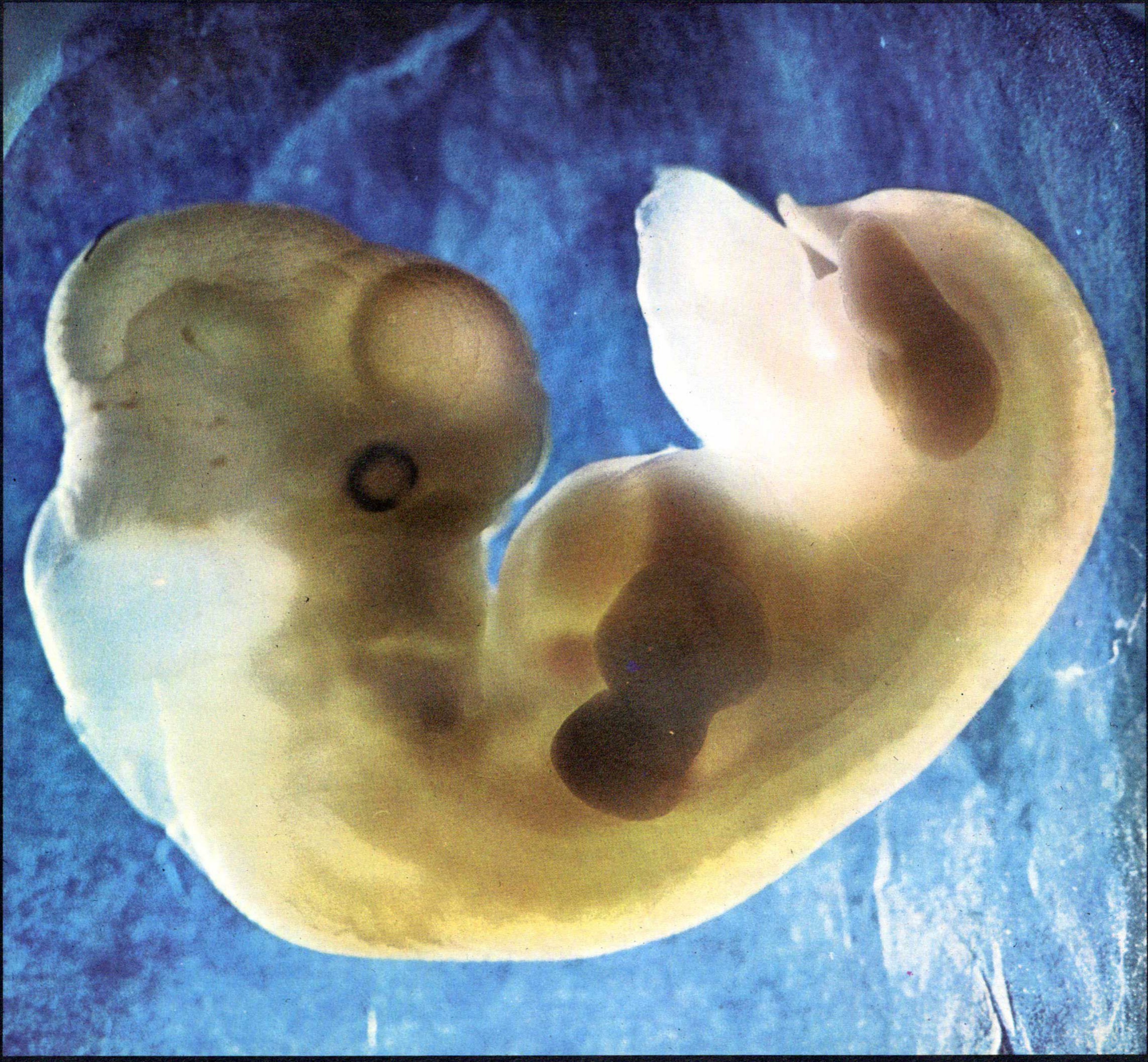
A blue-print for a beautiful face does not exist. For it all depends on one's cultural standpoint. In the East, the ideal for centuries has been the flat-featured, 'melon-seed' face – a preference essentially based on ethnic characteristics. In the polyglot West, the mass media – and especially the ubiquitous Hollywood film – has promoted the big-eyed blonde to widespread pin-up popularity. But probably most men would warm to the youth, health, shining eyes and glowing skin of these women. 1. Polynesian beauty. 2. Tahitian girl. 3. Siamese girl. 4. Japanese beauty. 5. Bhill tribeswoman from Central India. 6. Southern European girl. 7. Dark-skinned African beauty. 8. Scandinavian girl. 9. Young girl from the Congo.



Lennart Nilsson

Six weeks after conception, this is a child-to-be. Only an inch in length, the embryo is already forming eyes and limbs.

The Child and his World

First days of an unborn child

Between that first union of sperm and egg, and the day when an unborn infant can first turn his head and frown, lie three extraordinary months

THIS is where you began: in the total darkness deep within a woman's body. This is the moment of conception: it is a central climax of life. It involves the hopes and fears, the bodies and emotions of two living people. And it is the meeting place of the smallest and the largest cell in the human body, the sperm and the egg.

The story of life before birth begins with an egg, a quarter of the size of this full stop. A single sperm (50,000 times smaller than that egg) wins an astonishing obstacle race, thrashing its tail to cover the human equivalent of a swim several miles against the stream. This sperm is the first, among many millions of competitors, to reach, pierce and fertilize the egg's tiny globe of jelly. *Only four weeks later, the fertilized egg will be transformed to an embryo, ten thousand times larger than the original globe of jelly. And this embryo will have its own, beating heart.* In our lifetime, medical science has learnt to chart and even photograph this process in astonishing detail as the story unfolds.

A woman's ovaries lie about three inches on either side of the mid-way point between vagina and navel. At birth the ovaries of a baby girl contain half a million immature eggs; by puberty, this number has shrunk to about 10,000. Once a month from now on, in alternate ovaries, an egg which has ripened in its own small bed, reaches maturity and bursts free. The event is called *ovulation* and it normally occurs half-way through the woman's monthly cycle – 14 days after the start of a period and 14 days before the beginning of the next. This is the so-called 'fertile period' when the woman is most likely to conceive, although as it can happen at any time, there is really no 'safe' period.

The egg that bursts from the ovary floats into the abdominal cavity, a vast space in which it risks being lost altogether. But in most cases it is wafted towards the mouth of a tube connecting the ovaries to the pear-sized womb. Minute finger-like structures surround the opening of this Fallopian tube, whose diameter is no more than that of a human hair. If there is going to be a pregnancy, it is most likely that it will be here that the egg will meet the sperm.

Millions of spermatazoa reach the egg, but only one can penetrate it. It may be that millions are needed to dissolve the substances that surround it. We do not know what decides which sperm is in the end to join with the egg.

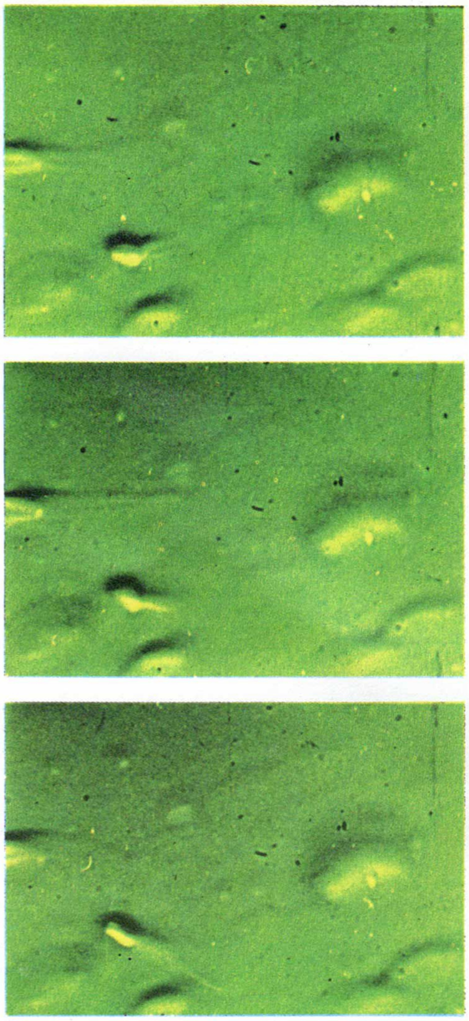
WHETHER or not a pregnancy has occurred, the womb prepares itself each month to receive a growing embryo. During the third week of the menstrual cycle, the lining of the womb grows thick, spongy, and rich in tiny blood vessels which are preparing to nourish a growing embryo. If none arrives, this thickened wall decays and passes away in menstruation; if there is a pregnancy, chemical substances called hormones are produced which prevent the lining of the womb from breaking down.

At the moment of conception the egg and sperm fuse together to make one cell. Each of them contains only a half set of the chromosomes (materials which transmit inherited characteristics) possessed by all other body cells. When the two half sets are fused together into one cell, that cell has the genetic material to make a unique human being.

Thus the new cell contains a blueprint for the baby's future development. It ensures that the embryo will develop from the two sets of chromosomes into a human being, not an animal or plant. It lays down what will be the colour of his hair, eyes and skin, his blood group and, to some extent, even whether he will be tall or short, plump or skinny, intelligent or stupid.

Dispositions to certain diseases, or resistance to others, are 'written in' to this blueprint too. It will have a considerable influence on what sort of career that human being will make, the type of character he will have, and whether he will die young or live to a ripe old age. Many of these tendencies will be greatly altered by environment both before and after birth. But environment can only act on the basic 'genetic code' which will unfold and reproduce itself in all the millions of millions of cells in the body.

The sex of the baby depends on the type of sperm that fertilizes the ovum or egg. Sperms which give rise to boy babies have special sex chromosomes called Y. Sperms which give rise to girl babies have special sex chromosomes called X.



Portrait of a powerful swimmer, above, shows a single sperm's progress in the competitive journey to the egg. Propelled by a whip lash tail, the tiny sperm, one 500th of an inch long, moves at a tenth of an inch a minute. In the head is all the genetic material. Once the whole sperm is inside, right, at the moment of conception, a new life has begun.

Twelve first facts of life

- **Every month after puberty the womb prepares itself for pregnancy.**
- **Between 45 and 700 million sperms compete at once to fertilize the egg.**
- **The sperm can live up to two days, occasionally more, in the female body.**
- **The colour of the baby's eyes is decided at the moment of fertilization.**
- **The first cell division takes place 30 minutes after fertilization.**
- **Sex is determined by the father.**
- **Pregnancy can be confirmed three weeks after conception.**
- **Within the first 30 days of life, almost every organ has started to form.**
- **The heart starts to beat on the 25th day.**
- **A baby gets food from his mother through the placenta.**
- **After 12 weeks the foetus is $2\frac{1}{4}$ inches long. It weighs $\frac{3}{4}$ oz.**
- **Fingerprints are engraved in nine weeks from conception.**

The mother's ovum always has an X chromosome. Thus, at conception, the cell that will be a boy is a combination of X from the mother and Y from the father giving XY. A cell that will be a girl is a combination of X and X giving XX.

In general the chromosome Y, which leads to maleness, is linked with certain weaknesses. Boys have a greater tendency to die than girls of all ages, particularly in infancy and in later life. Women tend to live longer than men. Many diseases and disabilities are carried on X chromosomes, for example haemophilia and colour blindness. They do not reveal themselves when balanced by a normal healthy X. But a Y chromosome is not strong enough to overcome them. For this reason haemophilia affects only boys, and colour blindness is extremely rare in girls. In general, girls can only carry these conditions and transmit them to their sons but they do not suffer from them themselves.

As soon as conception has taken place, the new cell begins to change: within about 30 minutes it is ready to divide into two cells. Ten hours later these two divide to make four, the four to make eight, then sixteen and so on. It is this way of developing that accounts for the astonishing fact that by the end of two days there is a substantial cluster of cells known as the 'morula' or mulberry.

All the time the cells are dividing, the cluster is rolling along the Fallopian tube towards the womb. It is a journey that takes about five days.

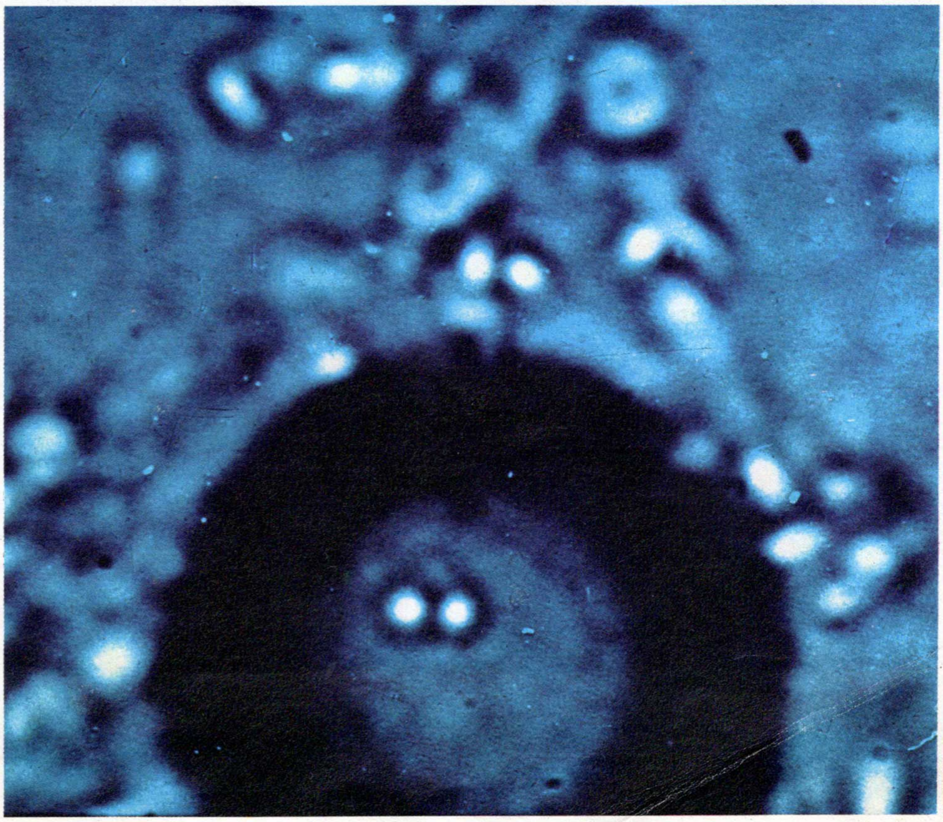
Rolling down the tube, the little collection of multiplying cells now has the form of a tiny fluid-filled sphere, called a *blastocyst*. It derives nourishment only from itself. Once in the womb, it floats for a few days in a fluid rich in sugar and salts (and probably gets food from it).

Developing continually, the sphere embeds itself in the womb's wall, usually in the upper part. The wall disintegrates at that point to form a tiny cavity. The blastocyst burrows into the cavity and the womb lining spreads over to cover it. It is in this position, just under the lining of the womb, that the embryo will grow for the rest of pregnancy.

NOT all the blastocyst cells become the future human being. Some, by growing into the uterus, develop as the *placenta*, the vital bridge of life between the embryo and the mother. Some become the *amnion*, the protective, liquid-filled balloon that surrounds the developing form.

But from the lump of cells at one side of the blastocyst, three crucial layers begin to develop: from the outer layer will emerge skin, nails, hair, sweat glands, eye lens, mouth lining, tooth enamel, lining of nose, salivary glands and all nervous tissue. The middle layer is the origin of muscle, bone, cartilage, inner skin, blood vessels, kidneys and connective tissue. The inner layer will produce the stomach and intestine, the liver, pancreas, bladder, glands such as the thyroid, and the lining of the lungs.

Although at four weeks the embryo is only half the size of a pea and still so delicate that it seems to be hardly more than a tiny scrap of jelly the extent of its physical change from the egg is an achievement more dramatic in speed and scope than any change that lies ahead.



The sperm has entered the egg. Now the vital centres of both – the two nuclei – lie side by side about to fuse. The presence of the new nucleus stimulates the egg into action, and soon it will divide.

Mondadoripress

Already the embryo has a well-defined head region, with rudimentary eyes, ears and mouth, a body, and a brain which is beginning to divide into sections. It also has a short stub of a tail for a while, which forms the basis of the human coccyx, the last of the bones in the spine.

On about the twenty-sixth day tiny limb buds appear: first the arms, then, two days later, legs. By the end of the first month the embryo has developed simple kidneys, a liver, a digestive tract and a blood stream. Its heart, still a primitive U-shaped tube one-tenth of an inch long, is usually beating by now. In proportion to the size of the body, this heart is nine times as large as in an adult, and within a few days of beginning to pump, it is efficiently circulating the newly formed blood round the embryonic body. The baby's blood, now as always, is a closed system of vessels separate from the mother's blood circulation.

DURING the second month the embryo becomes more recognizably human: the eyes, nose, mouth and tongue emerge more clearly, the limbs grow longer and more buds appear on the end of them, which later form the fingers and toes. Soon even fingerprints develop.

In these early stages the brain and spinal cord grow more rapidly than anything else, so that compared with the rest of its body, the embryo has an enormous head. The brain develops from the outer layer of cells which forms what is called the *neural tube*. Part of this tube remains straight to form the spinal cord; part of it curls on itself to form the brain.

At the same time, cells from the middle layer arrange themselves in segments alongside the neural tube, and eventually develop into vertebrae, separate parts of the backbone with muscles attached to each. Once the tube has closed, it is separate from the outer layer cells which multiply to form the skin covering the growing embryo, while the tube forms the central nervous system.

The digestive tract is formed by another tube when the sides of the embryo bend over until they meet each other underneath. The front part of the gut enlarges to form the pharynx.

Bumps (called branchial arches) appear which are related to the later development of the jaw bones and other structures. The stomach is another enlargement of the digestive tract, and it is probable that the rest of the tube grows very rapidly during the time between the sixth and tenth week, which would account for the intestines later being so long and coiled up.

At first the embryo is more or less symmetrical to left and right, but then the gut twists round on itself and the body develops asymmetrically with the large intestine in front of the small intestine, and the liver on the right.

Meanwhile another enlargement occurs at the bottom end of the digestive tract: this is the *cloaca* and from it develops the future rectum, bladder and external genital organs. The bladder becomes divided from the rectum by a thin wall which grows down between them, and at the end of the tube develop the external genitalia. A swelling, known as the *genital tubercle*, appears at the front of the opening of the tube, and this develops as the glans penis or clitoris. Folds grow backwards from this round the opening of the cloaca. In the male these folds meet to enclose the urethra – the small tube leading from the bladder to the exterior – which then extends to the glans with the growth of the penis. In the female these folds do not fuse and are the forerunners of the *labia minora,* the inner lips that surround the opening of the vagina and urethra. At the side of each of these folds there is another swelling. In the male these develop into the two halves of the scrotum and in the female they form the *labia majora*.

The lungs grow from a groove in the front wall of the pharynx. This gradually encloses on itself to form a tube which is completely separate from the gut except at a small point of communication in the upper pharynx. This new tube is an early development of the trachea or windpipe. Its upper end forms the larynx or voice box, and its lower end produces buds which gradually develop into bronchial tubes and lungs.

The development of the deciduous or baby teeth begins about six weeks after conception. Outer layer cells move under the surface of the developing embryo and collect to form enamel organs which fit like caps over small collections of cells belonging to the middle layer which lie in the primitive jaw. By the tenth week the rudiments of all 20 teeth are present; during the eighteenth week the beginnings of the permanent teeth appear, and by the end of nine months the rudimentary buds of 24 permanent teeth have developed.

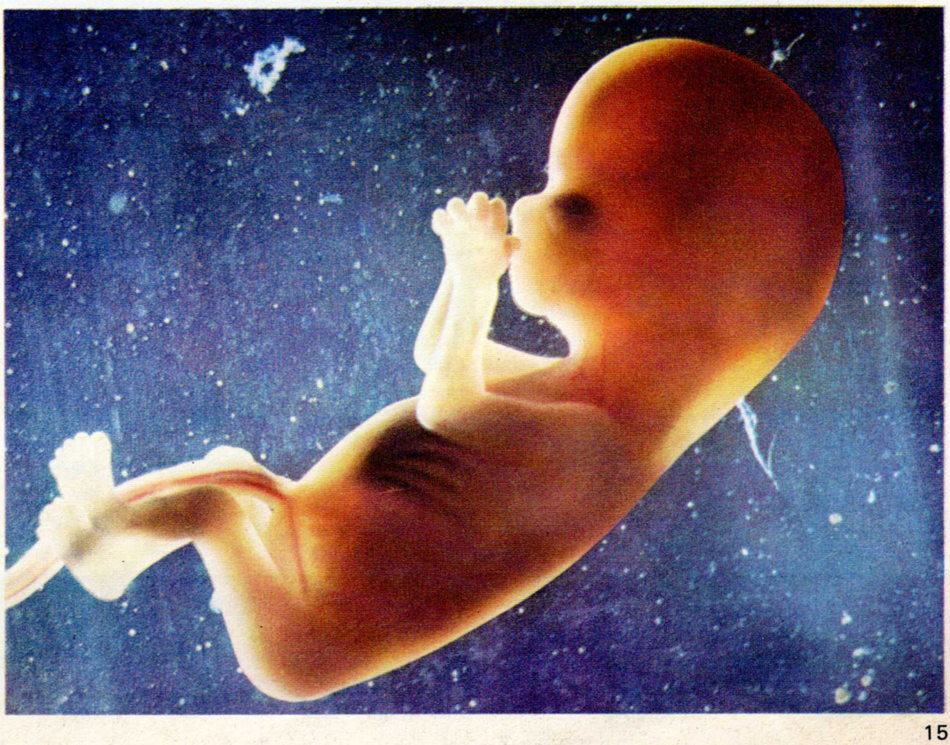
DURING the third month the baby becomes even more recognizably human. Although he is still only three inches long, he is highly developed. His nerves and muscles begin to grow very rapidly and so do the connections between them. They begin to work for the first time and most of his body becomes sensitive to touch. The first movement probably takes place in the jaw muscles; these are the earliest to develop, and as early as the sixth week, their stimulation can give rise to the first reflex. This movement is the sideways bending of the neck away from the stimulated side. During the seventh week more muscle and nerve fibres become capable of responding, and by the eighth week the upper trunk and arm muscles, then the lower trunk and leg muscles are included. After this, spontaneous movements develop rapidly.

When he is two months old, eyelids can be seen forming over the lenses of his eyes, which during the following week begin to take on their oval shape. The upper and lower eyelids now meet and join: they do not re-open until he is seven months old.

By the end of the third month the foetus, as he is now called, can move and kick, swallow, spread his toes, make a fist, turn his head and frown. He is still too small for his mother to feel these movements – but the time is not very far distant when, if the foetus hiccups, she will feel every one. A new life has quickened within her. For every woman, the experience is a miracle unique and unforgettable.

A life-line, the umbilical cord connects the ten-week old embryo to the placenta. Protected by a fluid-filled sac, the embryo is nourished by this route. Across the membrane of the placenta, food from the mother's bloodstream 'sieves' through into the bloodstream of the embryo. Waste products are expelled in the other direction. At 11 weeks, right, the first reflex movements are made.

Lennart Nilsson



Observer/Transworld Feature Syndicate

As our society becomes increasingly complex, so pressure builds up on the individual. Normal feelings of anxiety can turn into a serious illness. The first symptom of an anxiety state may be tension – the inability to relax.

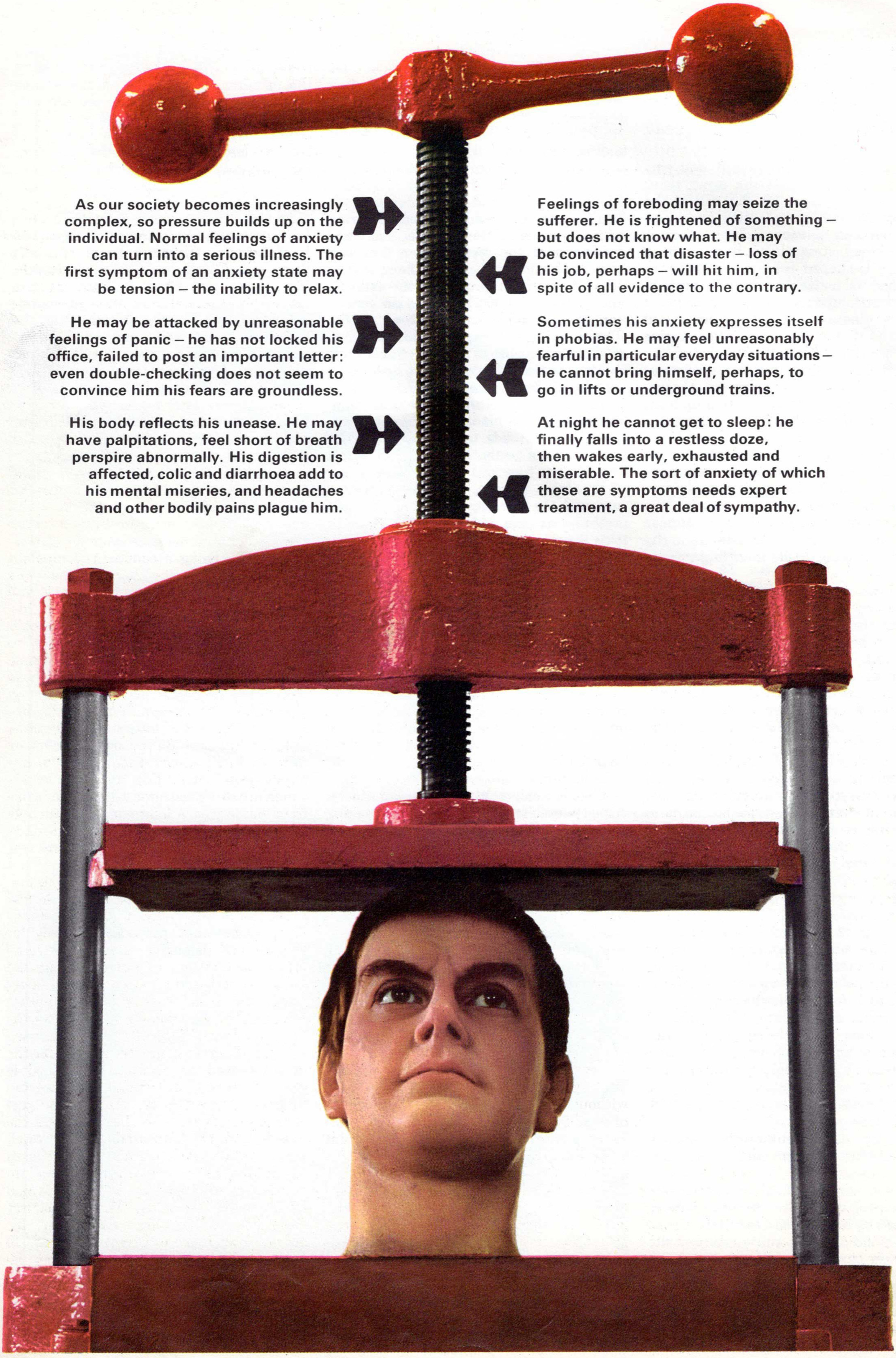
He may be attacked by unreasonable feelings of panic – he has not locked his office, failed to post an important letter: even double-checking does not seem to convince him his fears are groundless.

His body reflects his unease. He may have palpitations, feel short of breath perspire abnormally. His digestion is affected, colic and diarrhoea add to his mental miseries, and headaches and other bodily pains plague him.

Feelings of foreboding may seize the sufferer. He is frightened of something – but does not know what. He may be convinced that disaster – loss of his job, perhaps – will hit him, in spite of all evidence to the contrary.

Sometimes his anxiety expresses itself in phobias. He may feel unreasonably fearful in particular everyday situations – he cannot bring himself, perhaps, to go in lifts or underground trains.

At night he cannot get to sleep: he finally falls into a restless doze, then wakes early, exhausted and miserable. The sort of anxiety of which these are symptoms needs expert treatment, a great deal of sympathy.



John Banks Head Courtesy of Madame Tussauds

Human Mind

Answers to anxiety

Strain and stress are a special hazard of twentieth century life. Anxiety is one of the most frequent conditions a doctor sees. Where does anxiety strike? What can now be done to ease it? Can doctors measure an anxiety level?

A beautiful woman approaching forty peers in the mirror: she asks herself if she is losing her looks. An executive in a top job watches a younger man climb up the promotion ladder: he wonders if his position is in jeopardy. A student counts the days to an important exam. A farmer looks at the lowering clouds and fears for his fields full of wheat. All these people are anxious, in one way or another.

Anxiety in itself is not abnormal. Nobody lives wholly free from stress. And indeed anxiety may be the spur to doing something positive about a situation – the woman who fears for her beauty may decide to take more care of her face and figure; the executive to increase his efficiency; the student to study harder; the farmer to get in the harvest today instead of leaving it till tomorrow.

It is only when anxiety is irrational, unproductive and persistent that it may be a symptom of mental illness. This sort of anxiety has been defined in various ways: one authority describes it as 'a diffuse feeling of unease', while a leading neurologist calls it 'fear spread out thin'. Dr Stafford-Clark writes of it as 'a persistent feeling of tension and anxiety for which the patient can recognize no fundamental cause. He is apt to say that he feels worried about everything, but he is often not at all sure why he finds everything so worrying. Another description that he may use is that he is afraid, but he does not know what he is afraid of or why he is afraid of it . . . it is this condition of constant gnawing fear without discoverable cause which is so singularly striking in a patient with an anxiety state.'

Such a patient is probably a neurotic – so long as his condition lasts. He is to be distinguished from a psychotic. The neurotic is in touch with reality, the psychotic has lost touch. The neurotic thinks himself inadequate, perhaps, or weak, or succumbing to cancer or awaiting some unknown misfortune. The psychotic may think himself a general engaged in an historic retreat or attack, or imagine that people are trying to kill him with invisible rays.

However, some authorities consider that the difference between 'neuroses' and 'psychoses' is merely one of degree.

The symptoms of anxiety are tension; feelings of foreboding; panics; phobias; palpitations, and sleep disturbance and psychosomatic complaints such as tense feelings in the stomach region, stomach upsets, headaches and so on. But physical states cannot be considered apart from the mind or brain, for the body is an entity rather than a collection of small parts. The implications of prolonged anxiety can be serious; it can lead to depression which can become severe and even suicidal.

Certain people by the nature of their occupation – the professional, executive and managerial classes, for instance – can be particularly vulnerable to anxiety. The responsibility involved can become too much for them. The obsessive executive who gets to the office before his staff and leaves long after they have gone home, refusing to deputise sufficiently because 'if you want a job done properly, you've got to do it yourself', may be on the way to a serious anxiety state. Usually, too, such people do not offset extremely hard work with sufficient healthy relaxation.

For some people, frayed nerves may be a way of life. The television producer watching half-a-dozen monitoring screens in the control room, is constantly keyed-up to give split-second timing to the assistant who switches from camera to camera – and he is also on the look out for things going wrong in the studio; the airline pilot must keep his concentration despite unpredictable complications or weather changes in flight; the newspaper editor, battling to get the edition out on time, has to deal with crises like the late news items that must somehow be fitted into the front page.

Sometimes, people deliberately induce feelings of anxiety in themselves or others. Athletes on the verge of a record-breaking attempt have been known to vex themselves deliberately with thoughts of some disaster – perhaps an earthquake or tragedy at home – to give themselves added impetus. Film directors sometimes set out to put the star 'on edge' by sarcastic comments, destructive criticisms and unreasonable interruptions; with actors of a certain temperament, this treatment produces good results when it comes to 'the take'.

ANXIETY however can reach disastrous proportions. The executive who never spares himself, the airline operator working excessive hours without rest, may well build up a level of anxiety that becomes habitual and constitutes an anxiety neurosis. At this point it is dangerous to mental and physical health.

The executive and professional classes are, of course, not the only sufferers. There are innumerable human and social situations that can produce intense feelings of anxiety. A wife or husband worried over the fidelity of their partner; news that a train has crashed, on which a loved one might have been travelling; financial troubles, sickness in the family; premature retirement or the boredom that sometimes follows retirement when an active life has been exchanged for unaccustomed leisure; a feeling of failure at being passed over for promotion; the emotional disturbance inherent in adolescence; sexual frustration – everyone can add their own items to such a list.

Internal conflict is a common source of anxiety. A natural reaction to all difficult and dangerous situations is fight or flight. When neither is possible, a person is pulled in two directions emotionally. A typical example was an intelligent, good-looking and healthy woman organiser who was the sole support and companion of her aged, blind mother. A young man wanted to marry her, but did not want to set up home with the mother as well. She was in love with him but found the thought of deserting her mother intolerable. From being a confident, competent cheerful person she became gradually more and more anxious until her work and health suffered. There is no easy medical answer to a human situation of that sort.

There was no real predisposition to anxiety in that particular case. But some people, however, are predisposed and vulnerable. They can be 'sparked off' by situations that reproduce painful memories and buried conflicts – such as a bullying father, some personal tragedy or even an environment that recalls an unhappy experience. The catalogue of ills which are to some degree related to or arise from anxiety is a long one. What people fail to realize is that anxiety is not usually self-indulgence or an escape from responsibility.

An anxiety state is acute if it comes on suddenly and does not last long; and chronic if it continues for years. The emergency mechanisms that prepare the body for evasive or defensive action, triggered off by the release of adrenalin into the blood, continue during an acute anxiety state; the blood supply to the muscles increases by for example a raising of the blood pressure; the blood sugar is increased so that there is a greater supply for the muscles used in combat. The blood is drained away from the skin and diverted to more urgent jobs, and the subject goes pale. There may be spasm of the muscle which surrounds the bowel, bladder and stomach. Breathing increases in rapidity so that more air is taken into the lungs. All this may be accompanied by excessive sweating. These measures designed to prepare the body for action such as a burst of speed to escape a mad bull, have no outlet, no release, if the cause of the anxiety is intangible.

Can anxiety be measured? One rule-of-thumb method is to list potential factors: 1, job; 2, money; 3, home; 4, family;

5, sex and marriage; 6, personal relationships. Award *no marks* where a factor does not produce feelings of anxiety, *one mark* for 'some anxiety' and *two marks* for 'much anxiety'. Make a similar tally of things that help to relax you – such as 1, smoking; 2, drink; 3, social activities; 4, sex and marriage; 5, holiday; 6, sleep. Deduct the second total from the first.

Some therapists find this test a helpful guide to progress when it is administered before and after treatment. It cannot be called a scientifically accurate method because its accuracy depends upon the truthfulness and accuracy of the patient's own answer, and patients who are mentally disturbed, tense or fearful may not always give correct answers. But it is better than guesswork.

There are also physical tests. Measuring handwriting pressure is one – it is *lower* in more anxious persons. Another involves measuring the electrical resistance of the skin, for variations in skin resistance indicate variations in the activity of the sweat glands. Measurement may conveniently be made from the hands, which have the highest density of sweat glands. Experiments have shown that patients with anxiety states could be identified in this way. Studies carried out at St. Thomas's Hospital, London, revealed that the flow of blood through the forearm is increased in the case of anxious persons. A 600 per cent increase is not uncommon.

THE apparatus used is called a water-filled venous occlusion plethysmograph and its responses are compared with heart rate and blood pressure under both ordinary and stress conditions. The patient simply lies comfortably and is encouraged to relax while the apparatus is set up. This takes about fifteen minutes, and the patient is then left undisturbed for fifteen minutes, while recordings are made at one minute intervals. This gives the normal or 'basal' response. Similar recordings are then taken under 'stress' conditions; the patient is asked to do mental arithmetic, and this induces anxiety.

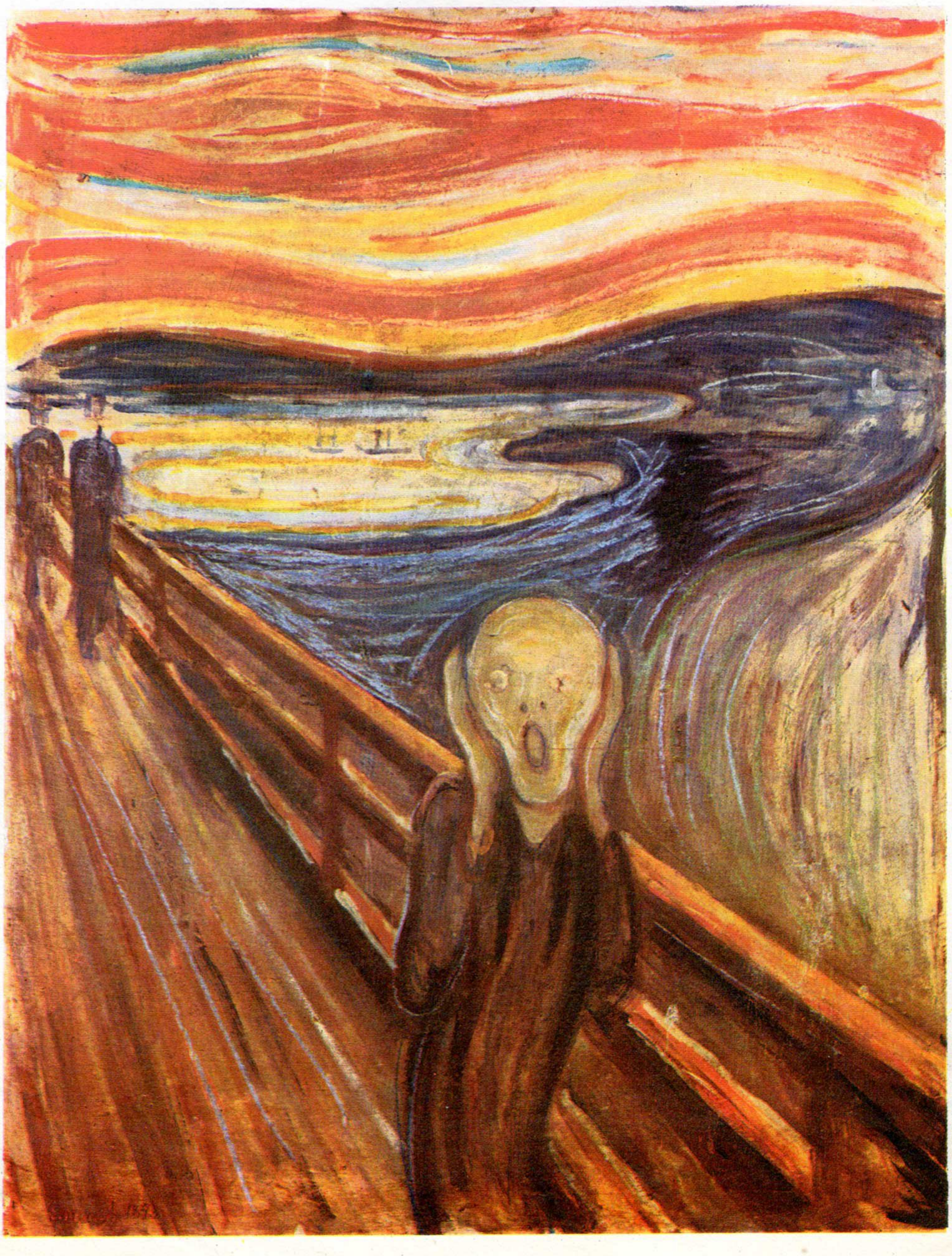
The tests are useful in assessing anxious states, but not phobias, which are specific fears induced by particular stimuli – for instance, claustrophobia which is a fear of closed-in spaces. In addition, the apparatus is expensive and bulky, while the tests necessarily take time. In practice, only a small proportion of people suffering from anxiety could be tested in this way.

To what extent do social factors produce anxiety? It is generally agreed that overcrowding, excessive noise, and the struggle to 'keep up with the Joneses' produce more stress than a spacious, less exacting environment. The anthropologist

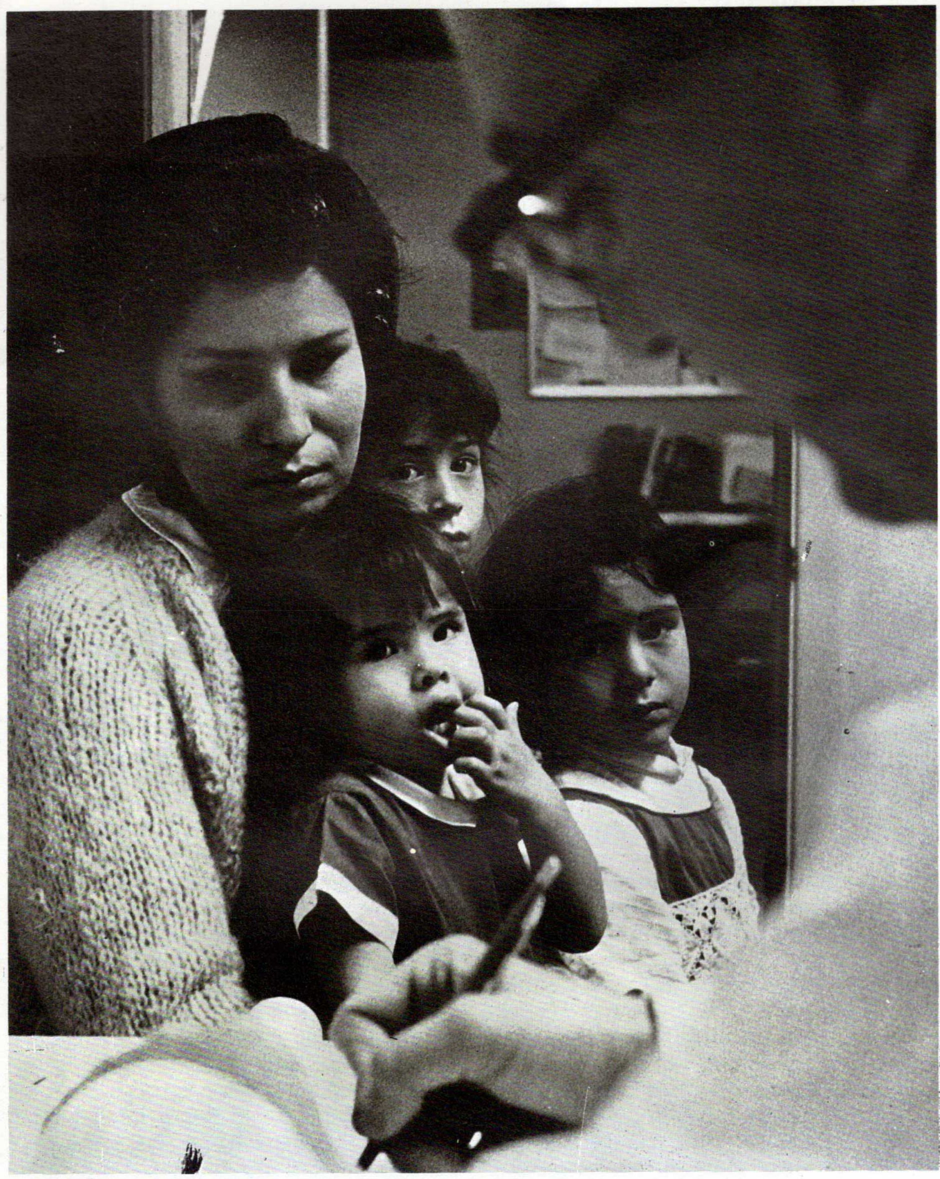
Anxiety may strike suddenly, or may build up slowly. For the woman who has lost her husband in a mining disaster, anxiety arrives as a thunderclap. But the man alone in a city who has time to brood on his problems, in doing so may make them seem greater than they are. The noise, crowds, endless rush of town life may further aggravate his anxiety.

Popperfoto

Jean Ribière


Nasjonalgalleriet Oslo

Edvard Munch's painting, *The Cry*, well illustrates one expert's definition of anxiety: it is fear spread thin. Art, an outward expression of the mind's complexities, can reveal to skilled interpreters much about the life within.



Look Magazine/Transworld Feature Syndicate

Frank Habicht

The woman with a family, attending the doctor's surgery, may have a lot on her mind. Illness, money problems, many mouths to feed, all these can add up to build a state of anxiety. Feelings of anxiety are often strongly repressed, and the twisting of a handkerchief may be the only outward sign of inner tension.

Margaret Mead made a careful study of the ways people live in Samoa. She was struck by the extremely low incidence of anxiety and mental illness. The community she studied was free-and-easy, less concerned with keeping face and acquiring possessions.

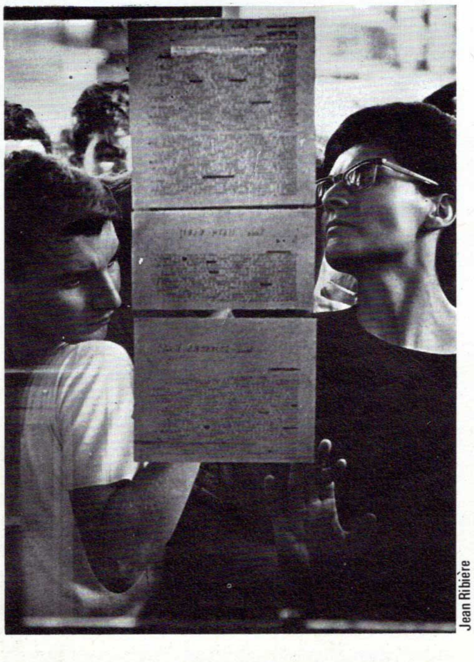
But doctors cannot, as a rule, change their patient's environment, and must therefore find some other way of helping the sufferers. Once barbiturates were the main antidotes to anxiety and tension, but in the 1950s and 1960s a whole range of drugs that reduce anxiety symptoms has been made available. But the busy general practitioner often has to remind himself not to treat the anxiety symptoms with drugs and ignore the individual and his problems. Nevertheless, drugs are useful in an emergency, and for relaxing the patient sufficiently to respond to psychotherapy.

As with most mental illness, anxiety has its roots in human problems. In his diagnosis, the doctor must take account of the difficult situations the patient has to face and the basic physical, economic and mental equipment which he can bring to bear on them. Methods for teaching relaxation, psychotherapy, and other approaches designed to help the patient cope with his environment, have been developed to alleviate anxiety, but it remains a serious problem in the technologically advanced societies.

And it is a problem that should always be viewed sympathetically. However absurd, even bizarre or irrational, the patient's anxiety may seem, the validity of that person's feelings must be acknowledged. For the suffering involved is very real. It is no help to pass judgement and say 'in such a situation, *I* wouldn't crack up like that', for people obviously respond very differently to stress. And as everyday life becomes increasingly complicated in Western urban society, is it surprising that anxiety in all its forms is so exceedingly widespread?

Keystone

Modern life in a crowded city may lead to frustration, which is a form of anxiety. Will my train be running tonight? Will I be home in time for dinner? These problems, temporary, and seemingly small, may add up to anxiety.



Jean Ribière

Students search worriedly for the results of their exams. Some sorts of anxiety are not always undesirable. Concern may spur individuals on to greater achievement, particularly in the business and academic worlds.

Victories in an endless war

"There has never been a Golden Age free from sickness and pain. There has never been a time when men did not seek to find new ways back to health."

ALL over the world, doctors' prescriptions begin with the same special sign like a capital *R* with a stroke across the righthand leg. That symbol, now much changed, was once used by ancient Egyptians to represent the Eye of Horus, the god of Healing. Today, the doctor calling for a powerful antibiotic drug, prepared in a gleaming new factory, reveals in this sign a link with men of medicine who lived 5,000 years ago.

There has never been a Golden Age free from sickness and pain. There has never been a time when men did not seek to find new ways back to health. Polio was often called a scourge of modern civilization – but there are early Egyptian drawings of individuals obviously deformed by the disease. Malaria sapped the energy and cut down the population of Rome in the three centuries after Christ, just as it did in Greece in the 1800s. Ancient Egyptians had heart attacks; ancient Greeks died of diabetes.

Every civilization has had its medicines and methods for treating the sick. Often the story was one of magic and superstition. Sometimes, skilled men, working with few scientific aids, reached a remarkably sophisticated understanding of the way the human body functions.

But the progress of medical care has been slow. Only in the last 150 years have cures been found for some forms of the sickness and disease that have plagued us throughout history. Only in the twentieth century has a revolution really gathered speed, after all those centuries of pain and effort. Advances in medical knowledge and treatment have suddenly been made – in great number and with great rapidity. It is our privilege to live in a house that Man has been building and slowly perfecting for thousands of years.

In the Book of Genesis it is reported that God removed Adam's rib when he was in a 'deep sleep'. But no practical form of anaesthetic was found until the middle 1800s. Before that time, surgeons amputated limbs with nothing to alleviate the patient's agony except crude pain killers like opium, alcohol, or mandrake. And most who lost an arm or a leg soon lost their lives from infection.

In the 1300s the 'Black Death', the terrible bubonic plague, killed half Europe and drove whole populations frantic with terror. In the 1600s The Great Plague killed thousands in London. Nobody knew why. Nobody could fight such unseen enemies.

The story of the Medicine of Man is fascinating for its trials and its errors, its personalities and the drama of its successes. In many respects, until the dawning of the 1800s the condition of medicine in Europe was worse than it had been long earlier. In the B.C. 300s, the Greek doctor Hippocrates (whose name has been linked with the Oath many doctors still swear on qualification) had replaced superstition with near-science, and firmly established ethical ideals. But in the Dark Ages following the collapse of the Roman Empire, such medical knowledge was forgotten or lost. Public health, which had been so important to the Romans, was completely neglected. And in comparison with the sewage systems of ancient Judaea or Egypt, medieval cities were open cess-pits. Even during the Renaissance, with its revival of interest in the teachings of the Greeks, medical knowledge advanced little. Progress was blocked by a wall of superstition. Monks cared for the sick as best they could, but, in the end, believed sickness was God's punishment for sin.

Masks, gowns and gloves are a wall against infection. Once, doctors washed their hands only *after* operating.

The human body and its workings remained a closed book. Corpses were sacred, and doctors anxious to study human anatomy were forbidden to dissect them. The first near-accurate anatomical plans of the human body did not appear until the 1500s. They were published by Vesalius, an eminent professor of anatomy in Padua. He had gained his information as a student in Paris, by stealing the corpses of hanged criminals and dissecting them. It was not until the early 1600s that the English doctor William Harvey discovered that the heart was a pump which circulated blood round the body.

Yet even at the end of that same century, after Charles II, the first 'science-minded' English king, had put his blessing on The Royal Society, a great organization for advancing scientific knowledge, English doctors were still prescribing medicines made from dried vipers, saliva from a fasting man, excrement, urine, human placenta, wood lice and the ground skulls of executed criminals.

But now, at the close of the eighteenth century, the beginning of the revolution was at hand. In Europe, the horrifying disease of smallpox had ravaged everywhere, disfiguring those it did not kill. A 'beautiful' woman was simply one with an unpitted complexion. At the end of the 1700s a London physician named Edward Jenner accidentally discovered that an infection of cowpox from diseased cattle gave immunization against the disease. By the time he died in 1823 his vaccination – *vaccinia* is the medical name for cowpox – was world-famous. But neither he nor, for a long time afterwards, anyone else, understood how or why it was effective.

The pace of discovery quickened in the nineteenth century. Industry, railways, the improvement of communication, the spread of education, hastened a breakthrough in medicine and surgery. Nitrous oxide, 'laughing gas', was discovered in 1799. But only in the mid-1800s was its medical value revealed – by sheer accident. In December, 1844, an American showman was demonstrating laughing gas at a fair. Dr. Wells, a local dentist, had a brilliant idea as he watched a volunteer from the audience lose consciousness during an experiment. The next day, after having himself made unconscious by the showman's gas, Wells had one of his own teeth painlessly extracted. From there the way was wide open to apply anaesthesia to more serious operations. Queen Victoria set the seal of approval on the use of anaesthetics when she demanded to be anaesthetized during the birth of Prince Leopold.

THE new painlessness opened the way to ever more radical surgical operations. But the benefit was almost neutralized by the horrors of post-operative death from infections known as 'hospital disease'. Occasional pioneers had wondered whether the filthy conditions in which operations were performed might have something to do with this. Surgeons washed their hands after operating, not before. But it was not until 1865 that antisepsis (the process of applying strong germicides to wounds) was born. The British doctor Joseph Lister applied to his own efforts in surgery some recent discoveries about germs which had been made by the French scientist Louis Pasteur. The way was then open to *asepsis:* the almost total removal of germs by sterilization of everything used in an operation. Today, the most complicated operations are performed with little danger of infection.

Pasteur's germ discoveries were not just the trigger for asepsis and modern surgery. They made possible the development of the enormous list of drugs used today to prevent disease, to cure it when it develops, or at least to hold it in check.

THE germ researches of Pasteur also led to the understanding and widespread use of methods of immunization. In 1879, he accidentally allowed a culture of chicken cholera to get stale before infecting some chickens with it. The injection didn't 'take', so he injected the same birds, and another batch as a control, with a fresh culture. The 'control' chickens became sick with the disease – those which had had the earlier, stale injection did not.

Pasteur saw the resemblance of the protection offered by his disease culture and Jenner's smallpox vaccine – and for the first time the relation between immunization and disease was understood. He soon had a vaccine ready for chicken cholera. Later, vaccines were developed against such killers as anthrax, human cholera, typhoid, plague, yellow fever and typhus. The search for new vaccines continues. In the twentieth century Man can forearm against whooping cough and tuberculosis. The famous Salk and Sabin vaccines have cut the toll of poliomyelitis.

In the 1930s Gerhardt Domagk, a German chemist, was searching for a substance which would kill offending germs without harming the living body in which they were working. He found that infected mice injected with a red dye, Prontosil, survived when they should have died. The first human being to be injected with Prontosil, was Domagk's daughter, who was desperately ill with blood-poisoning. The doctors had given her up but she recovered.

Prontosil was the beginning of the family of sulphonamides, coal-tar derivatives, now manufactured in quantity made to treat a number of different infectious diseases.

A yet more important set of drugs was born in 1928, when the lid slipped off a dish containing a germ culture which Alexander Fleming was breeding in his laboratory at St. Mary's Hospital in London. A mould had settled on it, and Fleming was about to throw the culture away when he noticed that the mould was apparently destroying the germs. After more work and tests, Fleming realized that he had discovered a germicide which was effective on skin surfaces, named it Penicillin, but did not think of its possible medical application inside the body. Ten years later Ernest Chain, working at Oxford under Howard Florey, found Fleming's notes on Penicillin. He discovered it to be used as an internal germicide and remarkably effective against various infections. It was the first of the antibiotics, and is still widely used today.

Soon, doctors began to tackle the problem of malfunctioning organs. Fifty years ago sufferers from diabetes – a condition caused by inadequacy of the insulin producing gland – simply became more and more ill until they died. But in 1921 two Toronto doctors, Frederick Banting and Charles Best, succeeded in extracting insulin from the pancreas and discovered its sugar-regulating effects on diabetic dogs. Today regular doses of insulin are used to keep diabetics functioning almost normally.

Another body deficiency, which causes a gap in the blood-forming capabilities of the bone marrow results in an illness called pernicious anaemia. Before 1926 this was a certain killer – after that time its victims could be kept alive on a diet of raw animal livers. Towards the end of the forties Vitamin B_{12} was isolated and was found to be an effective substitute for liver. This was just one, though a very important one, of a whole alphabet of vitamins named by a Polish bacteriologist, Frederick Funk early in this century.

Doctors now know a great deal about the body, and the progress in their treatment of its ailments has been phenomenal. They still have a long way to go to know as much about the mind. But recent discoveries have totally revolutionized the treatment of mental illness. Insanity, the most mysterious of illnesses, had been thought by the ancients to be a visitation from the gods. The medieval Church in Europe branded the insane as witches to be burned at the stake, or as sinners possessed of evil spirits which must be driven out.

The first step in the revolution came when Philippe Pinel, on his appointment as head of a great Parisian mental hospital in the late eighteenth century, removed the chains from his charges.

SOON after Pinel, William Tuke in England and Benjamin Rush in the United States founded similarly enlightened mental hospitals. Treatment grew gradually more humane throughout the nineteenth century. But the social attitude of the sane towards the mentally sick has shown fundamental changes only in our own days. Even now there persists a faint memory of the witchhunt.

After Pinel there was no real step forward in the knowledge of mental disease or its treatment for over a century, until the Viennese doctor Sigmund Freud published his findings on the mind, the conscious and the sub-conscious. His teachings initiated psychoanalysis – an entirely new method of treatment of mental diseases. Very simply, it rests on detailed research into the patient's history, as far back as infancy, to reveal the original cause of the present illness – the 'conflict' between the conscious and the sub-conscious. It aims at cure rather than at control.

As against this and other forms of psychotherapy psychiatrists do have some drugs to draw on. They do not actually cure the illness, but they can control it so that mental patients may live reasonably normal lives.

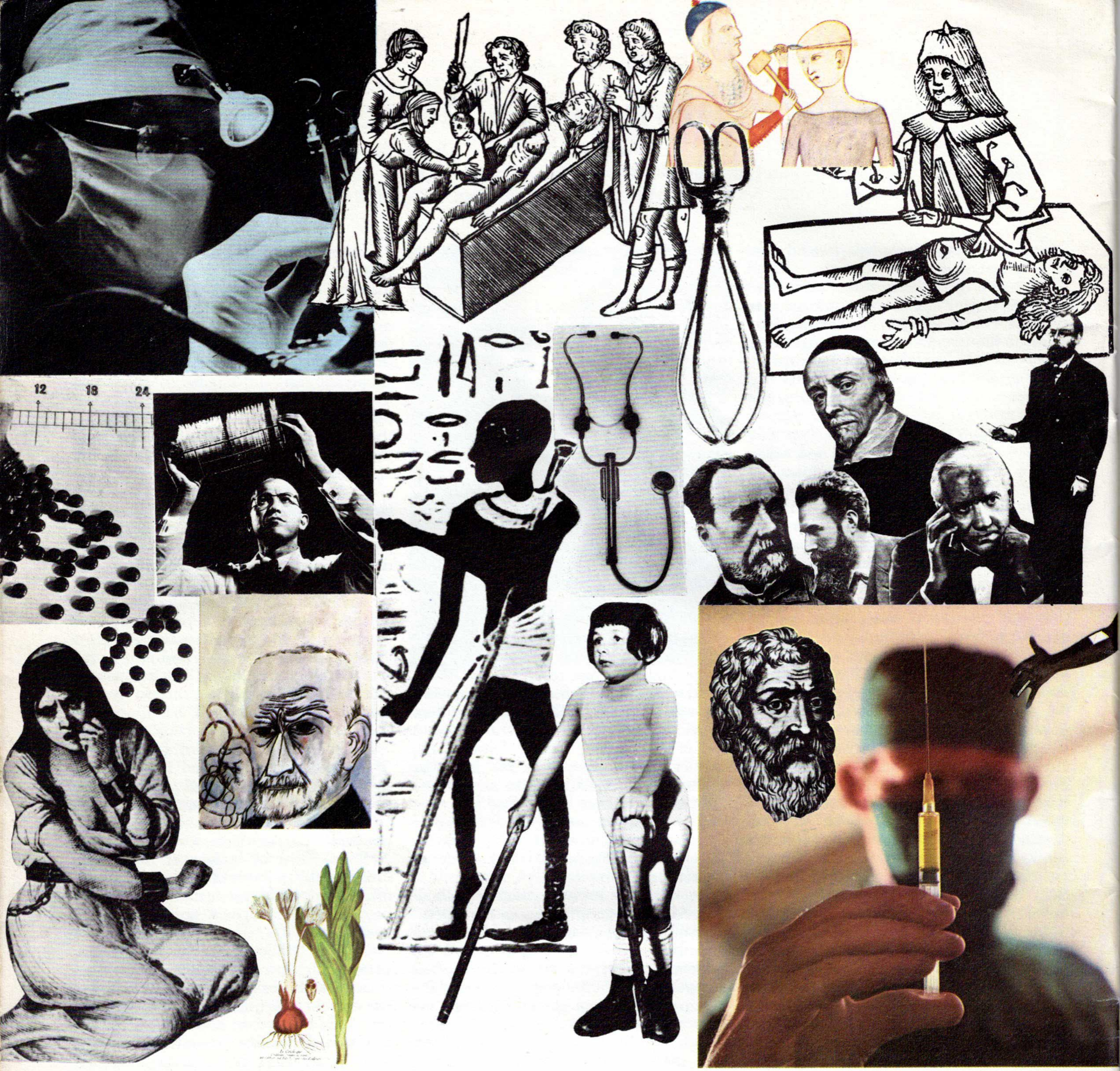
Antibiotics, sulphonamides and psychiatric drugs are only a part of the vast explosion of new and effective medicines. Their existence has transformed the role of the doctor, giving him weapons to fight illnesses where in the past he had only magic or herbal cures.

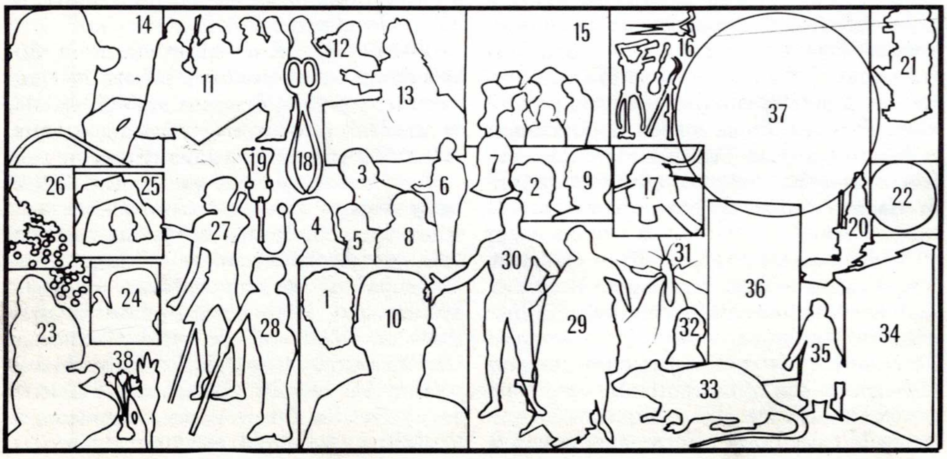
ADVANCES in medical knowledge – new techniques and new drugs – are brought to all parts of the world, and particularly to under-developed countries by WHO, the World Health Organization, an agency of the United Nations. With a budget of more than £23,000,000, it seeks to accomplish its proclaimed task 'the attainment by all peoples of the highest possible level of health'.

It is probably only a question of time before drugs or other means will be found to cope with two of the greatest killers of our time – heart disease and cancer. We can look forward to medical answers to the slow stranglers like arteriosclerosis, and the cripplers like arthritis – possibly even to minor but expensive irritations like the common cold.

There may be a breakthrough in our knowledge and understanding of the workings of the mind, an answer at last to mental disorders – permanent cure rather than temporary palliatives.

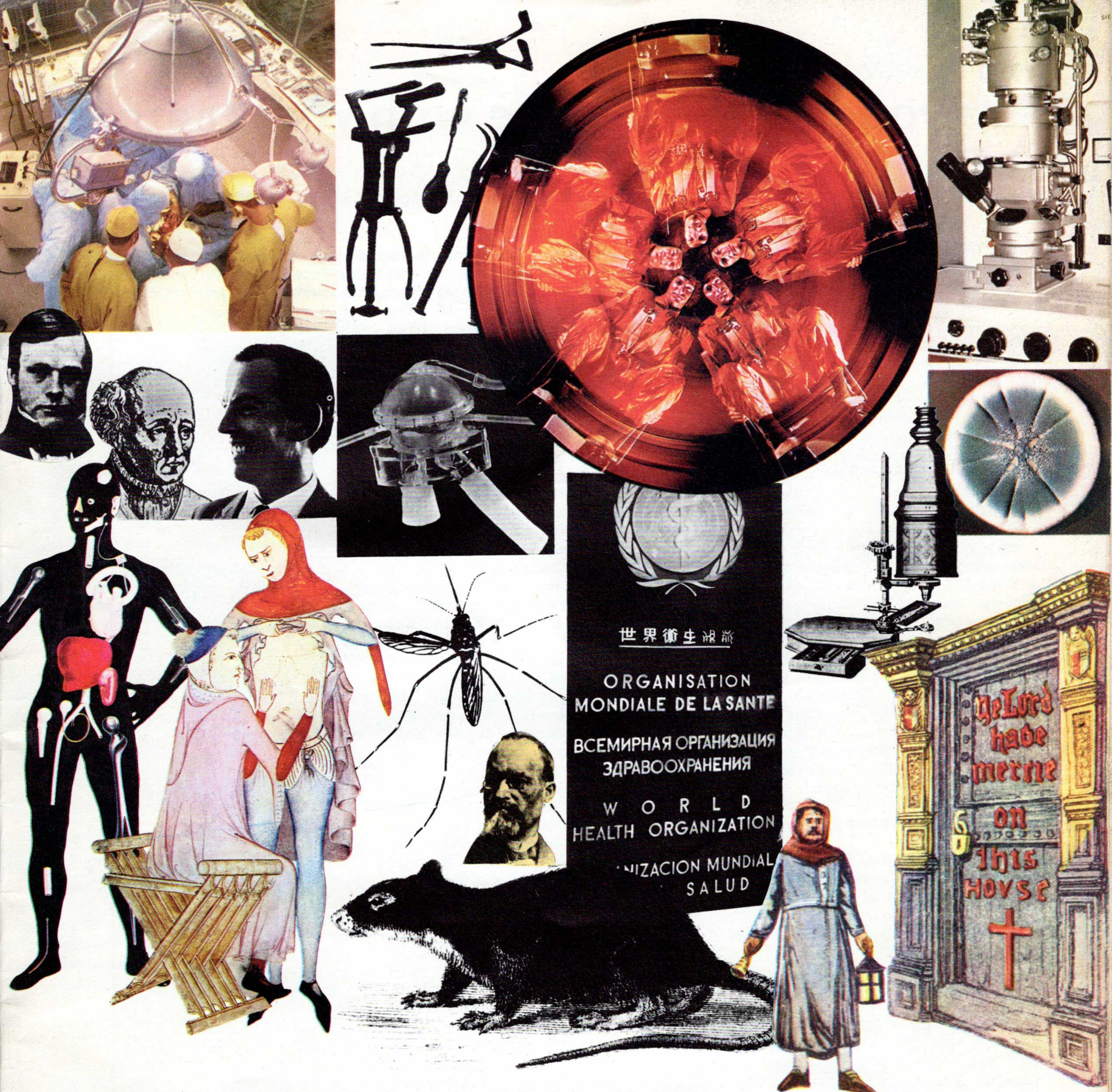
As for surgery on diseased or damaged body organs, the day may well be near when transplants will be as common and safe as tonsillectomies, a day when surgeons will be able to draw on heart, kidney and liver banks as today they draw on blood and eye banks. (Unless in the meantime, superior artificial organs will make human transplants unnecessary.) But the future is not, in matters of medicine, ever safely predictable. Despite the vast budgets devoted to medical research medical care will always be one of the most human – and therefore unpredictable – areas in which Man puts his skill and science to work.





Collage/Dorrit Dekk Pictures provided by : Mondadoripress; Scala; Musée Condé de Chantilly Photo Giraudon; Shell International Chemical Co. Ltd.; Courtesy of the Wellcome Trustees; Mansell; Radio Times Hulton Picture Library; Permission of the President and Council of The Royal College of Surgeons; Camera Press; Roger-Viollet; Popperfoto; U.S.I.S.; Dista Products Ltd.; Academy of Medicine Paris; Gordon Leedale; Karsh; Courtesy of Beecham Research Laboratories.

1. Hippocrates established healing as a science as well as an art. 2. Paracelsus declared war on the superstitions which attended 15th century medical practice. 3. The English physician, William Harvey discovered the circulation of the blood. 4. The germ theory of disease was first proved by Louis Pasteur. 5. X-ray photography was developed in 1895 by William Roentgen. 6. Robert Koch identified the tuberculosis germ and the cholera virus. 7. The era of modern surgery began when Joseph Lister introduced the practice of antisepsis. 8. The first antibiotic drug, penicillin, was discovered by Alexander Fleming in 1928. 9. In 1967 Christian Barnard performed the first successful human heart transplant operation. 10. Anaesthetics relieve pain and make prolonged operations possible. 11. Caesarian section received its name from the manner in


世界衛生組織
ORGANISATION MONDIALE DE LA SANTE
ВСЕМИРНАЯ ОРГАНИЗАЦИЯ ЗДРАВООХРАНЕНИЯ
WORLD HEALTH ORGANIZATION
NIZACION MUNDIAL
SALUD
ye Lord haue mercie on this HOVSE

which Julius Caesar was said to have been born. 12. Surgical operations in the Middle Ages were performed by doctors with little surgical skill and less knowledge. 13. Anatomical dissection was not introduced into medical practice until the 1500's. 14. Modern surgical operations are performed with a skill and efficiency unknown even 100 years ago. 15. The human heart is exposed in a modern operating theatre. 16. Roman surgical instruments indicate the advanced state of medical practice in the 1st century A.D. 17. Some hearts beat because of a booster pump – a possible forerunner to a completely artificial heart. 18. Obstetric forceps were invented by Peter Chamberlen early in the 1600s. 19. The workings of the heart are detected with the aid of an electronic stethoscope. 20. In the early 1700's a double microscope was used for viewing the circulation of the blood. 21. Electron microscopes magnify bacteria and viruses up to 200,000 times. 22. Penicillin mould produces a substance which prevents development of certain infectious diseases. 23. Humane treatment of the insane originated in the late 1700s. 24. Modern psychology began with Sigmund Freud's discovery of the working of the unconscious mind. 25. Dr. Jonas Salk discovered an effective vaccine against the ancient crippler poliomyelitis. 26. Drugs used to prevent or retard development of disease have revolutionized the practice of medicine. 27. An Egyptian man of the 1400's B.C. is shown with atrophy and paralysis of the lower limb – a condition now identified as polio. 28. Physical therapy will enable this polio-stricken girl to lead a normal life. 29. Medical treatment in the Middle Ages was hampered by a lack of knowledge of the human anatomy. 30. Spare-part surgery, triumph of twentieth century medicine can prolong life by the replacement of malfunctioning organs. 31. The mosquito has transmitted malaria and yellow fever. 32. In the late 1800s Alphonse Laveran discovered the parasite responsible for epidemic malaria. 33. Rats are the carriers of plague. Disease is spread by infected fleas. 34. God's mercy was sought against the plague, considered to be divine retribution for sin. 35. The Great Plague of London in 1665 took more than 68,000 lives. 36. W.H.O. brings medical techniques and drugs to suffering peoples throughout the world. 37. An important part of space medicine involves subjecting Man to new kinds of stress. 38. From ancient times effective medicines have been produced from common herbs like saffron.

Are you digging a grave with your teeth?

While one third of the world goes hungry, another third eats unwisely and too well. Understanding the ways that food serves the body is the first step to halting the damage which your dinner may do you

EVERY week there are a million more guests at the world's dinner table than there were the week before. One in three of them will never have enough to eat there. But one in three will always sit down to a full plate and still place his health at risk as a result. Doctors use one word, *malnutrition,* to cover undereating, overeating and wrong eating. The body is a unique piece of equipment, beautifully designed for survival. Starving it or insulting it can destroy its functioning. But what *is* food? How does it help or harm us?

A four point guide to thinking about food could read like this:
1. In order for food to be used to maximum effect, it should be nutritious – that is it should contain, in the right proportions, all the elements necessary for the maintainance, functioning and replacement of the body cells. 2. It should be palatable and desirable, satisfying at least three of the senses – sight, smell and taste. 3. The quality of the raw ingredients is important: these should be fresh and sound. 4. The way in which the raw materials are prepared, cooked and presented should enable the food to be perfectly digested, absorbed and assimilated to meet, through the blood stream, the diverse requirements of the body's cells.

Understanding the fascinating ways the body handles food is the first step to guarding against abusing the system. Food is the fuel source from which the body obtains energy for all its activities. A fire burns coal – the body 'burns' food. The heat released when food is broken down and digested by the body is measured in units called *calories*. An average man needs 2,900 calories a day. Calories are units of energy. The minimum rate at which each person's body just functions – the *basal metabolic rate* – requires under 1,200 calories a day. The additional amount constitutes what the body needs to meet individual daily energy requirements. Foods vary widely in the number of calories they will release when eaten. A grapefruit contains around 40 calories, an ice cream around 300. Some people consume as many as 2,500 calories in one meal alone, and the constant eating of sweets and chocolates can make the daily total as high as 3,500 or 4,000 calories. The body cannot use this extra carbohydrate at once: it is turned into fat (fat is one of the three sources of body energy) and stored under the skin. Foods' two other sources of energy are carbohydrates and proteins. All three are made up of the elements carbon, hydrogen and oxygen, while proteins also contain other elements, including nitrogen. Because the elements are arranged in different patterns characteristic to each one, they work in specific ways. Together with vitamins, minerals and water, the carbohydrates, proteins and fats provide the essentials for life. The whole human body – its blood, blood vessels, nerves, brain, heart, kidneys, liver, skin, muscles and teeth – needs these substances. Here is the way each of the energy sources goes to work:

Fats yield energy slowly. They gradually break down, during metabolism, into carbohydrates, carbon dioxide, water and energy. Fats may be divided into two main types, according to the chemical form they have after breakdown. The first type, called saturated fats, consists mainly of animal fats such as butter and lard, and on digestion are transformed into waxy substances called *cholesterols*. These are very closely related to fats chemically, and are carried round the blood stream. High concentrations of cholesterol in the blood have been linked to the caking of the inner lining of the arteries – *arteriosclerosis* – and to heart disease. The deposits in the arteries not only slow down blood flow, thus raising the blood pressure, but may break off and cause blood clots, thus closing the artery completely. The second type of fats, vegetable and fruit oils do not form cholesterols, and may even prevent them from being built up. In Denmark, where the consumption of dairy produce is high, there is also a high level of arteriosclerosis. In Italy, on the other hand, where olive oil is used in cooking, the disease occurs far less frequently. As a result, many medical researchers incriminate cholesterol in some kinds of heart disease.

The carbohydrates supply about half the body's total energy intake. They include the cereal products, sugars and starches. The body breaks them down into carbon dioxide (breathed out through the lungs), water, and energy. Again, if carbohydrates are not used by the body immediately, they are stored, either as fat or as glycogen in the liver. Sugar, the richest and most readily available source of energy, has been described as the world's greatest killer. The overweight connected with excess carbohydrate intake probably does lead to many of the fatal illnesses of the overfed Western world. The other extreme can be equally dangerous. If, perhaps as on a crash slimming course, the body is starved of carbohydrates, the digestive system cannot break down into fats in the normal way. Instead of glucose, fats are changed into substances called ketones which are like fats in their chemical make up. The ketone molecules mass themselves into ketone bodies, which accumulate in the blood stream. The resulting bodily disorders, known as *ketosis,* can cause

Britons drink 250 million cups of tea every day. A cup of sugared, milky tea contains 25 calories; ten provide as many as a meal.

The all-American hamburger tots up the essentials of a healthy meal. But too many such snacks, hastily eaten, may overwork the digestion and cause ulcers.

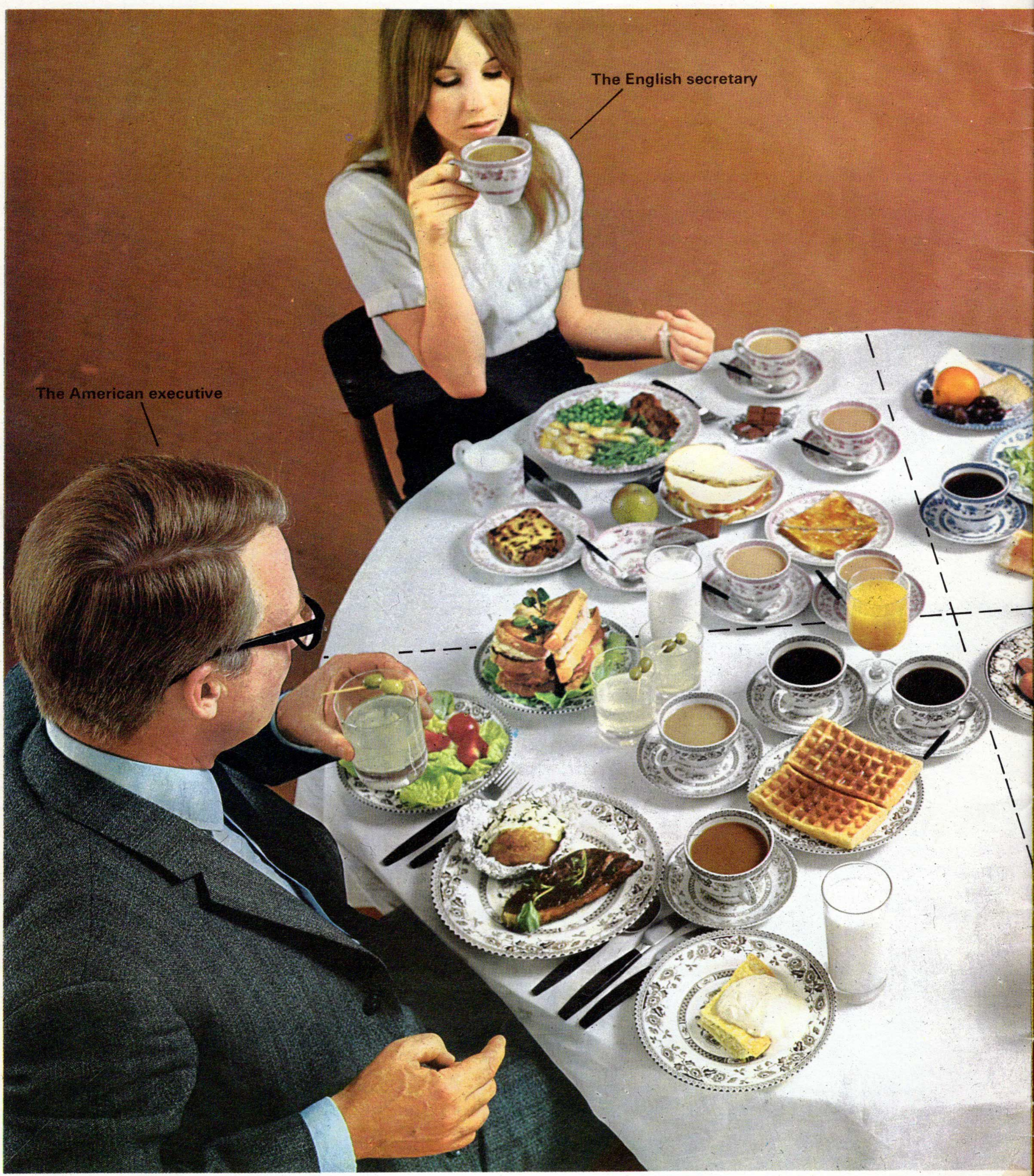
Australians replace body water, quickly lost in a hot climate, with cold lager. Excess drinking will distend the stomach.

Frenchmen, introduced to wine at an early age, usually drink a glass of wine with their meals. Over five per cent of Frenchmen are registered alcoholics.

Italians consume many calories, few vitamins, in an average helping of spaghetti. Pastas are large contributors to obesity.

Mike Gee

The German *wurst* may hang in a shop for weeks before it is eaten. Full of fattening cereals, it is one part of a large, rich diet. Overeating is a German failing.

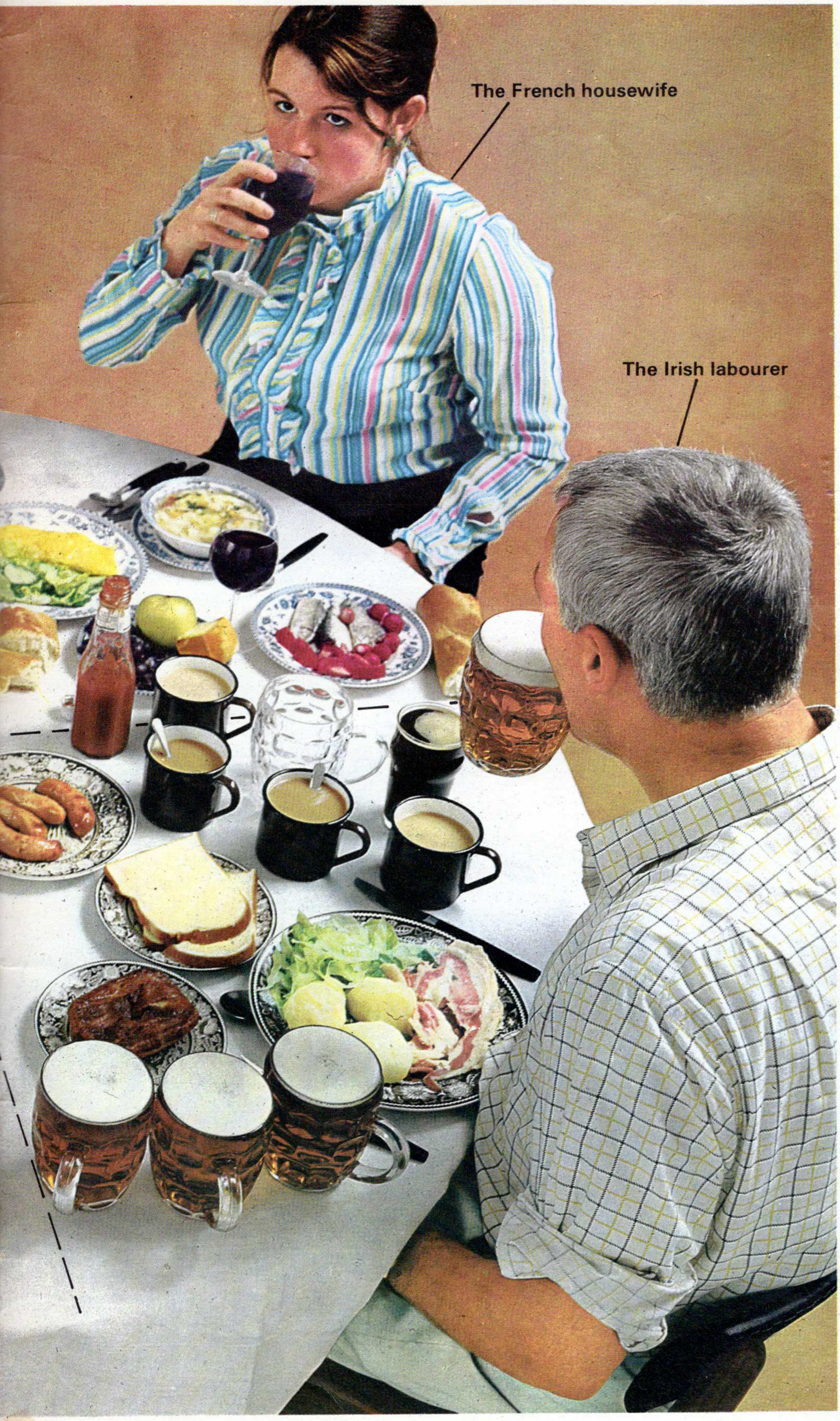


Overeating is one of the greatest problems of the civilized world. Food for a day from four western countries shows how eating habits vary, and how some people eat their way to ill-health more quickly than others.

The American executive overloads his body with carbohydrates. He drinks sweetened fruit juice, pre-lunch and pre-dinner cocktails, and sugars his coffee. He has a syrupy waffle for breakfast, a sandwich lunch, and does not abstain from potatoes or apple pie. Apart from mayonnaise, all the fats he eats come from animals – bacon, milk, cream, steak – so he may have a high level of cholesterol in his blood. If he is overweight as well, he could risk heart disease.

The English secretary who spends most of her day sitting down will find herself overweight and have a poor complexion if she does not change her eating habits. Like the American, she eats too many starchy foods, and her diet contains few fresh vegetables and no fresh fruit. Although regularly spaced, her meals are very unequal in size, and a scanty breakfast of tea and toast leaves her body ill-prepared to meet the rigours of the working day.

The French housewife eats more sensibly. Her diet contains plenty of fresh



Mike Gee

fruit, vegetables, meat and fish. She limits her carbohydrates to two pieces of bread for breakfast, one each for lunch and dinner, and a glass of red wine. Each meal is of a reasonable size, but like the American executive she relies almost exclusively on animals as a source of fats, so she too could suffer from high blood pressure or heart disease later in life.

The Irish labourer needs plenty of calories to supply him with strength, for his life is an energetic one. Like so many other people, however, he takes in more food than his body can use at once. The parts of his diet responsible for this situation are nine pints of beer a day and four cups of tea with milk and sugar. He eats no fruit of any kind and one vegetable in the form of cabbage. Overweight, and possibly vitamin deficiency may be his problems.

extreme pain and discomfort. For proper bowel-functioning, too, the roughage in bread and cereals, foods rich in carbohydrates, are essential.

The proteins are vital for body growth and repair. Meat, fish and dairy products are the main sources of protein, although there are proteins in vegetables especially in potatoes and yams. Proteins are broken down in digestion to at least 20 different amino acids. These are vital as they form much of the body's tissues and are also the basis of biological catalysts – enzymes – which control every chemical reaction in the body. But proteins cannot be stored. Only in extreme starvation are the proteins of muscles broken down, a condition known as wasting. The breakdown products of excess proteins are passed away in the urine.

VITAMINS play a part as a key regulator of the vital processes in the body. They are best found in natural, unadulterated foodstuffs. They were first discovered through study of the deficiency diseases of scurvy, rickets and pellagra, and more than twenty have been isolated so far; a lack of any one of these vitamins can cause severe disorder. Some vitamins are generally widespread, others contained in only a small group of foodstuffs. There are two main categories – the fat-soluble vitamins (including A, D, E and K) found in dairy foods, liver, fat, fish and green vegetables – and the water-soluble vitamins (vitamin B group and C). Serious dangers to health result from lack of vitamin D (found in fish such as herrings, salmon, kippers and mackerel). Vitamin D deficiency can produce rickets and bad teeth and, in the adult, depression. Vitamin C plays a vital role in metabolism; deficiency retards healing and causes general ill-health. Found in fresh fruits and vegetables in particular oranges and blackcurrants, vitamin C can easily be destroyed in foods that are fried, boiled, reheated, dried or preserved. Many of the meals prepared in restaurants, bachelor flats or by elderly people on a low income are often lacking in this essential vitamin. Scurvy, once rife in the navy, was the direct result of long periods without it.

Extravagant claims have been advanced from time to time for different vitamins – such as B_{12} and E – but a normally healthy person eating a well-balanced diet gets all he needs in the way of vitamins and does not require an extra allowance of one particular type. The amounts of vitamins required are small – but they are essential. The chart on page 28 lists the vitamins and their main sources.

Mineral salts are also necessary to the body. The most important contain calcium, phosphorus, potassium, magnesium, sodium, iron and iodine. These are found in milk, cheese, fish and fresh ripe fruits and vegetables and are important for growing children.

Iron is an essential ingredient of the haemoglobin in the red blood corpuscles which carry oxygen round the body. A deficiency of haemoglobin leads to *iron*

Vitamin and mineral salts chart

Vitamin type	Main sources	Notes
Vitamin A	Green vegetables, carrots, apricots Milk, cream, butter, cheese, egg yolk and liver (both from animals and fish) Animal fats (except lard)	Deficiency can lead to diseases of the eye
The Vitamin B complex	Yeast, oatmeal, wholemeal and wheat germ Eggs Peanuts Peas, lentils and mushrooms	Absence affects nervous system, causes beri-beri
Vitamin C	Fresh fruits and vegetables	Deficiency can lead to anaemia; and retard healing. Serious absence causes scurvy.
Vitamin D	Sunlight on skin: Fat fish (kippers, herring, salmon and mackerel) Usually associated with Vitamin A in, e.g. animal fats (except lard)	Deficiency can result in rickets, bad teeth, and in adults, depression
Vitamin E	Vegetable oils Wheat germ and green vegetables	The so-called fertility vitamin
Vitamin F	(The name often given to essential fatty acids.) Corn oil, safflower and sunflower seed oils	Deficiency can lead to kidney disorder and eczema
Vitamin K	Spinach and other green leaves of vegetables	Necessary for the functioning of the blood-clotting mechanism

Mineral salts	Main sources	Notes
Calcium (Ca)	Cheese, milk, parsley, watercress, spinach, brown sugar and black treacle	Important in pregnancy and lactation. Chief constituent of hard part of bones and teeth
Iron (Fe)	Beans, lentils, parsley, peanuts, brown sugar, black treacle Liver, fish and dried fruits	Deficiency may cause anaemia. Helps transport oxygen
Phosphorus (P)	Peas and beans, walnuts, yeast, eggs, cheese, wholewheat flour Brazil nuts	Essential for energy transfer in body's cells
Sodium (Na)	Dried apricots, beans, beetroot, carrots, celery, eggs, oatmeal, brown sugar, black treacle, peanuts, radishes, raisins Spinach, sultanas, swedes, turnips Yeast, watercress	Are involved in the chemical processes which purify the blood
Potassium (K)	Dried apricots, beans, Brazil nuts, dried currants, dates, figs, grapes, leeks, lentils, mushrooms, mustard and cress, oatmeal, parsley, peas, potatoes, prunes, raisins, sultanas, soya flour, brown sugar, black treacle, walnuts and yeast	
Copper (Cu)	Beans, Brazil nuts, wholemeal flour, lentils; mushrooms, parsley, peas, brown sugar and black treacle, walnuts	Very small amount needed with iron for formation of haemoglobin
Sulphur (S)	Nuts, dried fruits, barley and oatmeal, beans, cheese, eggs, lentils, mustard and cress, watercress, brown sugar and black treacle	Present in various proteins including those of muscle fibres

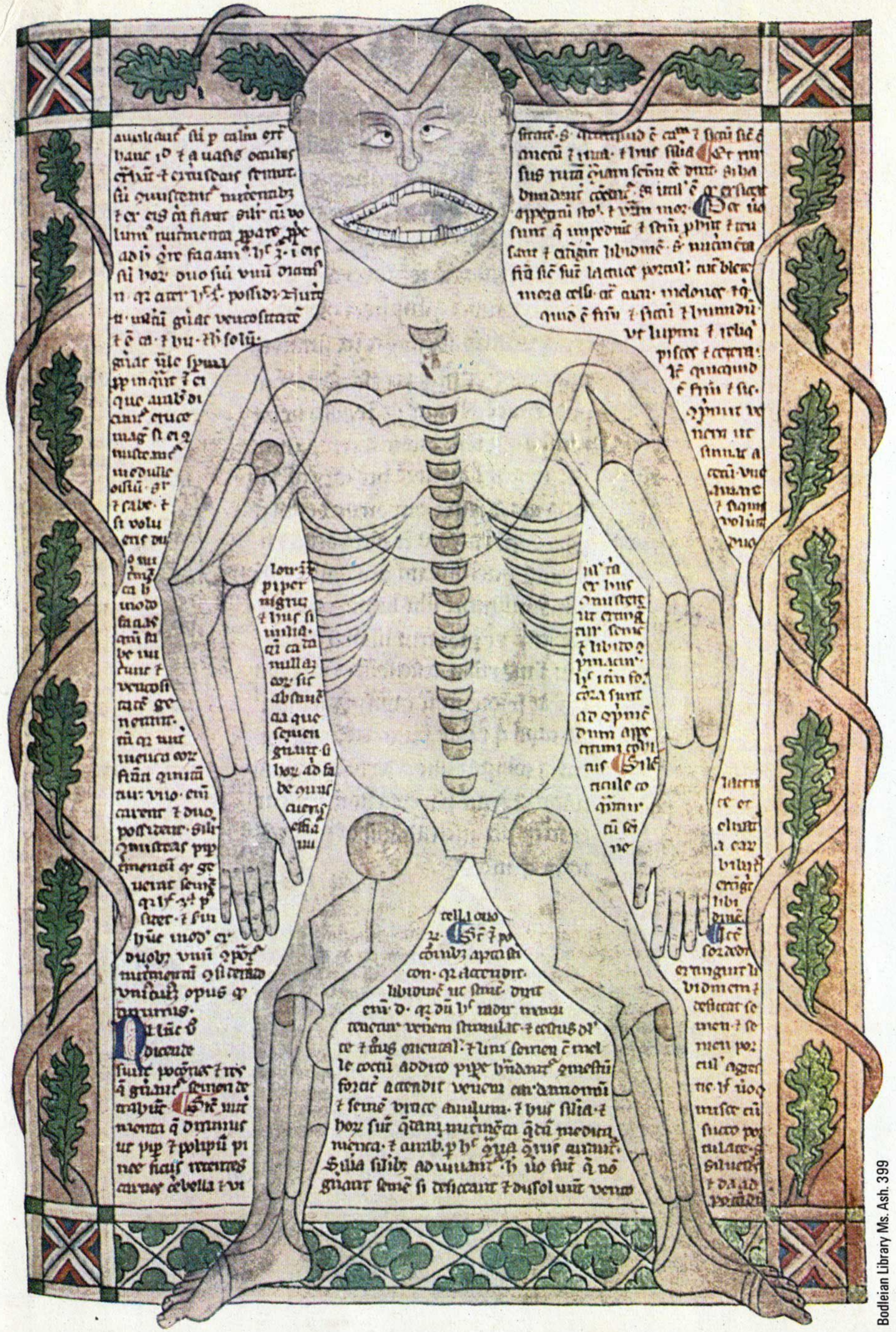
Sea foods, including Kelp and Carrageen Moss are a valuable source of the vital minerals that the body needs for health

deficiency anaemia – a state associated with lethargy and breathlessness in which the body is continually struggling to get enough oxygen. Dried fruit, liver, fish and spinach are good sources, and should feature in any well-balanced diet. Calcium is needed for the formation of the 'hard' parts of the body. In young children, a lack of this element can lead to weak bones and teeth, and in adults to splitting nails and hair and to decay-prone teeth. Milk is enormously rich in calcium, and is a balanced mixture of proteins, carbohydrates and fats, and a major source of vitamins A and B. Many diets could be improved enormously by substituting a daily pint of cows' milk for sweets, cakes and ice creams. *Iodine* is needed for the hormones produced by the thyroid gland in the neck. If the body balance is upset by lack of iodine, extreme changes in metabolic rate can result. The chart on this page gives a breakdown of some mineral salts and their sources.

SOME, if not most, of the foods mentioned as containing essential elements for the proper functioning of the body seem expensive, and many people with a low income like pensioners, or manual workers with large families to feed may exist on diets in which these foods are rare. Yet old people and children, too, are especially in need of these foods: the young if they are to grow, and the old if they are to keep their health and strength. And then there are many people, particularly city-dwellers, who lead interrupted lives and who often dine, at irregular intervals, on food from a tin or package rather than go to the bother of preparing fresh meat and vegetables rich in vitamins and minerals. Not only this, but the digestions of these people cannot be expected to work properly under such conditions, so that the food that *is* eaten is probably not used to the fullest extent.

What are the symptoms to look for – the warning signs that we are not treating our bodies with the respect they deserve? Excessive tiredness, depression, poor complexion, vociferous digestion, putting on weight, sluggishness, the temptation to eat when things go wrong. These will come first. If ignored, the body will continue to work harder to maintain the *status quo*, and if not properly fed possible results may include heart trouble, rheumatic gout, perforated ulcers, anaemia, and even blindness.

Healthy eating means regular meals of a reasonable size. Moderation is the key to maximum benefit. Excess of one type of food over another can be as disturbing to the digestion as starvation; irregular blow-outs leave the body with a surplus it cannot use. Absence may make the heart grow fonder, but only a certain abstinence will allow it to function at all. The price of self-indulgence is high, and the body must pay tomorrow for what it eats today. Fortunately, the rules for sane and healthy eating are few and simple. Given a basic knowledge of the way food works, almost everyone can become fitter for life.



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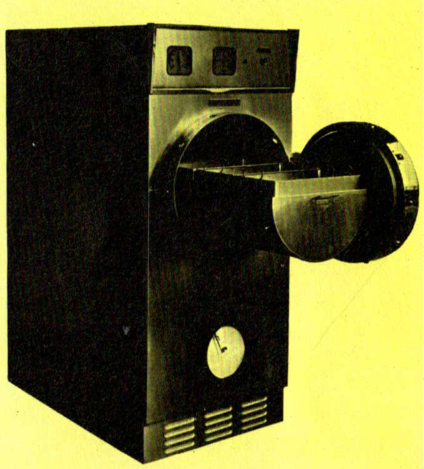
The development of the ability to use and understand speech, gestures, facial expressions and other forms of language is severely delayed, often leading to screaming as a means of communication. Characteristic disturbances of behaviour include fear of harmless objects while real dangers are ignored; an urgent need to keep wearing the same clothes, clutch the same toys, follow familiar routines, and so on; and retention of the babyhood habit of examining new objects by tasting and licking. The children can be greatly helped by special education similar in some ways to that used for deaf and blind children.



Steam sterilizes surgical instruments in a hospital's autoclave.

Drayton Castle

AUTOCLAVE is an apparatus for sterilization by steam under pressure. It consists of a strong, closed boiler containing a small quantity of water, and in a wire basket or perforated tin, the articles – surgical instruments, for example – which are to be sterilized. Because it operates under pressure, the water can be raised well above its normal boiling temperature, effectively killing bacteria over a period of time. Hospitals make extensive use of autoclaves.

AUTOHAEMOTHERAPY is a form of treatment by which blood is withdrawn from the patient's own vein and re-injected into his own muscles elsewhere. Once used widely, in the belief that it would stiffen resistance to disease, it has now fallen into disuse.

AUTOIMMUNIZATION is the process by which the body, in overcoming an attack of a disease, retains its immunity against further attacks. Most, but not all virus diseases (see **virus**), such as ordinary (as distinct from 'German') measles, chickenpox and mumps, produce autoimmunization.

AUTOLYSIS is the self-digestion of cells within the living body, or the chemical breaking down of the tissue of an organ by an enzyme (see **enzyme**) peculiar to that organ. Sometimes this process is quite normal as when injured tissue is digested and replaced. But sometimes, enzymes escaping through a wound to areas where they are not normally present cause destruction. An example is the escape of pancreatic enzymes (see **pancreas**) into the stomach through a fistula (see **fistula**).

AUTOMATISM is the performance of acts by a person who knows nothing of what he is doing. It occurs, for example, in somnambulism (sleep-walking), after an attack of epilepsy, after concussion, and in some forms of hysteria such as fugue (see **fugue**). A person suffering from such a condition should be watched in case he injures himself or others.

AUTONOMIC from the Greek words *autos* ('self') and *nomos* ('law') means independent in origin, action or function; self-governing. In medicine it is applied to that part of the nervous system which controls bodily functions not requiring conscious thought – the heartbeat, for example, the movements of the intestine, and respiration. A complete network of nerves exists for these purposes. Normally one is quite unconscious of its workings, but it can be influenced by the higher nervous system, producing such reactions as blushing (see **blushing**), 'nervous stomach' and palpitations.

AUTOPLASTY is the repair of a defect (such as a non-healing burned area of skin) by grafting tissue from another area or portion of the person's own body. Plastic surgery is one sort of autoplasty.

AUTOPSY is the correct description for the *post-mortem* (after death) examination of a body. It may be asked for by the relatives or by the attending doctors to ascertain exactly the cause of death, or to see whether some underlying condition has remained undiagnosed. It may be required by law if death is sudden or if the subject has not been recently examined by a doctor. In this case it is usually carried out on the orders of the coroner (see **coroner**). Except in remote places, the examination is usually carried out by a pathologist, who takes great care of the remains to enable a proper burial or cremation to be carried out. Some religions, notably orthodox Judaism, have a great aversion to such examinations, particularly the removal of any organ for further testing, such as microscopy. However, the practice has won wide approval for the light it has shed on bodily disease processes. In cases of suspected foul play, the autopsy result is vital in the compilation of evidence that a crime such as murder has been committed.

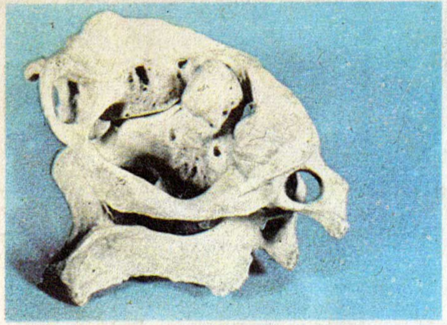
AUTOSUGGESTION means the acceptance of an idea, mainly from within one's own mind, which produces in oneself some change of bodily or mental state. It can be the persistence in the mind of ideas received while in a highly suggestible or hypnotic mental state. It is seen most dramatically after accidents, where a very slight injury may produce bizarre results – even paralysis.

AVASCULAR is the term for a bloodless area or part. Making an area temporarily avascular by compression can be of great service during operations on places like the middle ear.

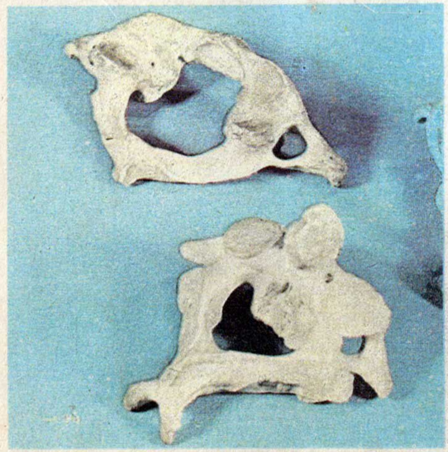
AVICENNA, Ibn Sina (980–1036) was a famous Persian physician who wrote in Arabic a great compendium of medical knowledge, the *Canon*, which was the accepted authority in the Middle Ages. He was the first recorded person to describe the preparation of alcohol and of sulphuric acid. He noted that the urine of diabetics was sweet, and described anthrax (see **anthrax**).

AVOIRDUPOIS, strictly, is the English system of weights and measures. Colloquially it is used of those putting on excess fat.

AVULSION, in surgery, is the destruction of a nerve – for example, to paralyse the diaphragm and rest a diseased lung.



Shown together and apart: the atlas and the axis vertebrae in the neck



Filmstrip by Educational Productions Ltd.

AXILLA is the anatomical name for the armpit. In the human the axilla is one of the few remaining sites of body hair.

AXIS – the line about which a rotating body turns – is used in medicine to describe the second cervical vertebra, around which the first, the *atlas*, turns.

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